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Separation of Street and Railway Grades at Columbus, Ohio

Swiss Methods of Keeping Silt Out of Reservoirs

Check Dams Used to Control Debris on Mountain Streams

Stormwater Pumps Drain Dallas Levee District

Tests on the Dallas Pumps

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Cleveland Stadium Laid Out as Ideal Baseball Stand

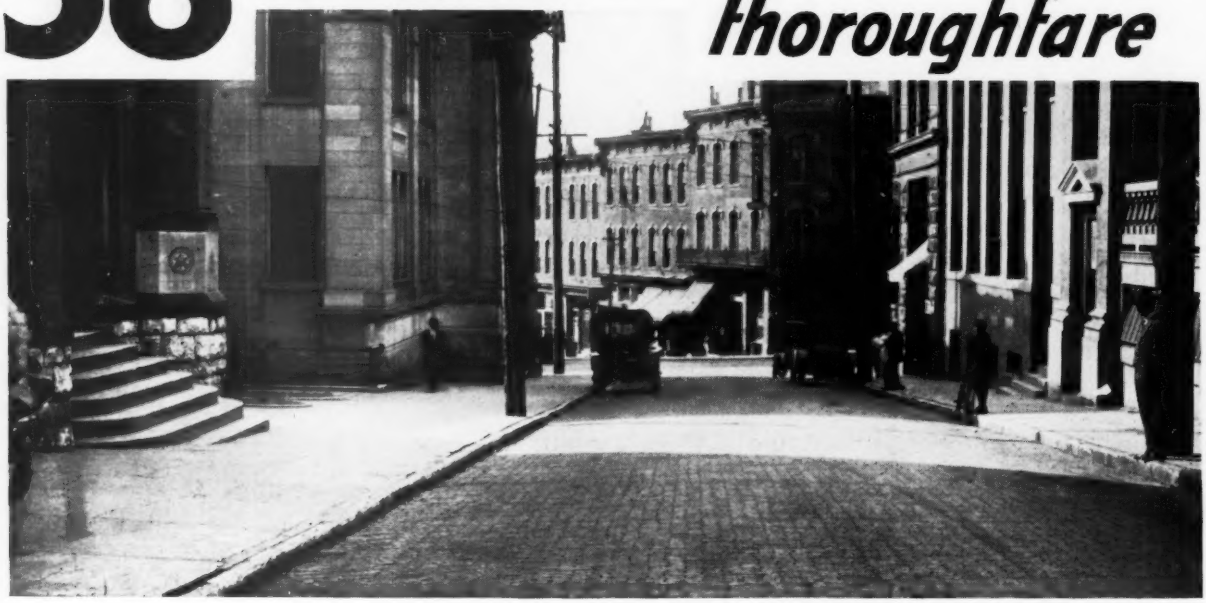
Unique Cantilever Bridge Replaces Old Suspension Bridge

Less-Used and Experimental Bank Revetment Structures

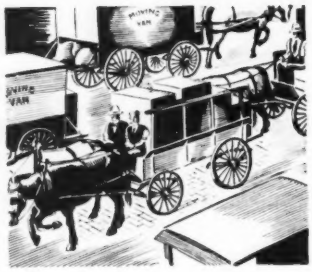
A Review of Recent Engineering Literature

Stormwater pumping plant
on the levee at Dallas, Texas.

38 Years *on a Chattanooga thoroughfare*



East Eighth Street, Chattanooga, Tenn. Paved in 1893.



BACK in 1893 the bicycle-built-for-two was a favored means of transportation. The automobile was unknown. "Heavy traffic" meant a stream of carriages, drays and bicycles. •• Brick pavements were preferred in those days just as they are now. And many of those pavements laid in 1893, as for example that on Eighth Street, Chattanooga, are still in excellent condition today. •• It is because these 30 and 40 year old pavements have given such remarkable service that most engineers today list brick as their first choice in paving materials. Modern brick pavements are smooth riding, restful on the eyes, making driving easier and more pleasant than ever before. Constructed on an adequate foundation, they will set new durability records even under the heavy bus and truck traffic of the present day. For true economy, safety, beauty and efficient transportation, specify brick.

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F. E. Schmitt, Editor

AUGUST 20, 1931

An Emergency Ahead

BUSINESS is no doubt moving toward new life and prosperity, but it is moving with desperate slowness. In the meantime some ugly facts confront us. Almost inevitably we will go into a bad winter of unemployment. At best a few of the five million or more who have had no work during the past year may find new employment, but millions will remain on the idle roll. And because many wageless months have depleted their reserves they will be less able to maintain themselves next winter than last. These things warn of a national emergency.

THE HOPES with which the year opened have been disappointed. At the beginning of the year a progressive revival of industry and commerce was in prospect. To hasten it and to provide means of existence for at least part of the idle, construction was pushed to an exceptional degree. Public works were projected in greater volume than ever known in history, and there was good reason to expect a revival of private construction after the low 1930 season. Forecasts indicated that money and credit would be highly fluid. All these forces in combination were to bring about a rapid decrease of idleness and hasten progressive convalescence of the business community.

These hopes have been shattered. Construction failed partly, business and finance failed lamentably, in living up to expectations. The sum of manufacture and trade is even less than it was a year ago and is picking up almost imperceptibly, on the most hopeful estimates. The great army of the unemployed has not been much reduced. Public construction has reached the peak for the season and will decrease largely by late fall. Private construction shows no sign of reanimation. There is still the slender chance of a brisk autumn season, but how much this can bring in the way of unemployment relief is doubtful. Unless a most amazing awakening of industrial activity comes to pass within the next three months, the winter will bring dire distress. Shall it be relieved by work or by charity?

IN VIEW of the great hopes pinned on increased construction activity some months ago, it is proper to ask how far the advance plans were carried out. The answer may be read from *Engineering News-Record's* weekly reports of contract lettings, which have consistently remained below the 1930 totals, even when adjusted for the lower bidding prices of the current season. Public works alone reach a large volume, though short of what had been counted on. Federal work came up to expectations, but some state work and much local work was delayed or checked by various causes—at bottom by the reluctance of taxpayers to burden themselves with further obligations, for fear that they might be crushed by the load. Private construction was far worse; instead of increasing it ebbed away further. Neither industrial nor residential building livened up, but on the contrary they decreased even below the stagnation level of 1930. The largest and most prosperous manufacturing concerns curtailed their plans, and even the utilities, though almost unaffected by the depression, trimmed their development programs to the bone.

There is yet no evidence, as has already been said, of resumption of private business activity or private construction.

NEITHER governmental power nor self-organization of business seems able to dictate such resumption. Only one agency remains through which more employment can be provided, and this is public-works construction. Can it and shall it be called upon in the emergency? The last twelve months showed that the effort to reawaken commerce and industry by increased construction was of no avail, but this does not mean that more forceful use of public-works construction would be ineffective. Where stimulants fail, heroic remedies are in order.

Emergency conditions such as those confronting us require emergency measures. The nation heretofore has been able to deal with the most threatening problems by organizing against them, and it can deal with this one. The means are not wanting: there is no dearth of food or clothing, housing or fuel, and we need only the mechanism of distribution—namely, work and pay. And if private work is not to be had, public work must be called into service. The opportunities for public work are unlimited.

PUBLIC construction can put to work, as it did fourteen years ago, every able-bodied citizen, of whatever craft or quality. It constitutes a reservoir of employment greater than any draft that could be made upon it. By tapping that reservoir, under competent system and organization, unemployment can be brought to an end and the winter's emergency forestalled. Either that or charity, whether the uncertain charity of private volunteers or the more certain and regular governmental dole.

It is up to the public-works authorities, legislative and administrative, to apply these facts to a practical end. What will they do about it? That question may fairly be asked by every citizen of his chosen representatives, for everyone is deeply concerned in the outcome. And haste is essential, for time is required to decide, to finance, to plan and to push work ahead to the contract stage. Barely three months remains before cold weather, and if public work is to help it must then be starting.

EDITORIAL NOTES

A Wage Reduction Fallacy

PROPONENTS of wage reduction rarely let a week pass without new argument for the necessity, the justice, and what not of lower wage scales. As in the case of one such speaker who set forth his views last week, the point on which the argument commonly rests is that the cost of living—by somebody's calculation, table or index number—has gone down. In their zeal to drag labor's compensation into the all-too-far-extended price slump, these arguers seem quite willing to add bacon and flour and cotton prices, or what not, and interpret the sum as a wage scale. They overlook the fallacy of such computation. They blithely ignore the fact that the whole story of the last two decades is woven of the extension of popular consumption beyond the range of mere food and housing. Industry lives on the fact that workman and farmer buy goods of rayon, and own radios and automobiles, or at least phonographs and cameras or bicycles; and no scale of "living cost" that regards the average worker as existing on the level of a grubstaked share-cropper can possibly have any bearing on the revival of industries—or utilities, for that matter. Our economic arithmetic has to be broadened beyond this view if it is to be other than anachronism.

Cutting Off Its Nose

ADDITIONAL information concerning the highway situation in Tennessee, including a number of letters criticising the editorial in our issue of July 16, brings forward no effective explanation of a foolish performance. Tennessee has stopped roadbuilding. It has taken this action because a political group does not believe in the honesty of the state highway administration and has succeeded in blocking legislative action to provide money for highway construction and maintenance. By a puerile move of partisan politics a program of needed state road improvement is disrupted. Further, at a time when every governmental means is being exercised to relieve unemployment, a disgruntled element of the state legislature has turned men at work onto the streets and denied potential employment to thousands of others. Tennessee stands before the other 47 roadbuilding states and the federal government crying out, "Because we suspect that the men we have employed to build roads are not honest we will not build any roads!" It cuts off its nose to spite its face.

Too Fast?

THE strike and subsequent shutdown of the main contract work at the Hoover dam appears to have been solved by discharging the persistent malcontents, reemploying the more tractable men and reorganizing the working forces. On the evidence there seems little on which to sympathize with the strikers. They were being paid on the basis of fifty cents an hour for common labor. Working in summer temperatures up to 120 deg. is a severe task for anyone, but the fact that climate could not be evaded by the employer any more than by the workman. Delay in supplying housing, which would temper the strain of working in extreme heat, was a logical complaint, but even this was the result of a laudable purpose to provide work at the earliest moment; the alternative was to delay employment until housing and living facilities were perfected. It is not evident that the employer failed to build the workmen's permanent quarters as fast as conditions permitted. The most that can be charged against contractor and government engineers is that they allowed the momentum of putting men at work to carry them beyond their ability to provide living accommodations. Ill-advised as the strike doubtless was, it may perhaps have useful repercussions in teaching the lesson of making haste slowly, which seems to have been forgotten in the fervor of inaugurating the Hoover dam construction to relieve unemployment.

Water

A VITAL ISSUE confronts the voters of the Southern California Metropolitan Water District in the form of a bond election that is to provide $220,000,000 toward the construction of the Colorado River aqueduct and accessory works. The seriousness of the water problem in that region has been a matter of increasing public discussion in recent years. Continued growth of Los Angeles and other communities in that section makes a large supplemental water supply imperative. Further, the present project is based on years of study and has the approval of eminent engineering authorities. Nevertheless, voting for a bond issue approaching $100 per capita in these times requires courage on the part of the public. Such courage is now needed. Passage of the issue will start a gigantic project that will become a boon to the lagging construction industry. That is not all. Southern California stands before a decision that will either stimulate or curtail its remarkable growth, according to whether the bonds are approved or disapproved. When Los Angeles was small compared with its present size, it alone voted what was then an enormous bond issue for the Los Angeles aqueduct, a move which contributed mightily to the growth of the city. The district should have no less courage.

Silt and Debris

SILT and debris carried along by running streams cause extensive trouble and expense to irrigation works and waterpower plants. Many schemes for disposing of them or reducing their harmful effects have been tried out. The two schemes discussed in this issue deal with swift mountain streams where coarse debris brought down at time of flood is the chief problem. Of the methods described, that used at two power plants in Switzerland is applicable only under limited conditions of valley conformation. The other system, employed by the U. S. Department of Agriculture, appears to have a wider application. Further, it has the advantage of being relatively simple and inexpensive. In one instance the entire cost of two control dams was only half as much as the expense incurred in freeing irrigation ditches of the debris brought down by the stream the previous spring. This type of control has been in use in Utah for nine years now. Its success there would seem to indicate that it can be used to advantage elsewhere.

Mountain Stream Control

CONTROL of steep-grade mountain brooks, by the way, is one of the numerous arts in which we have much to learn from European practice. Much control work of the kind has been done there, especially on the slopes of the Alps, while but few American cases have had to be dealt with. Check dams, storage basins and

flumed channels with drops, to prevent large-scale movement of material in freshets, have been refined through long service tests in the Alps. Growing development of our Western mountain areas will probably make the same field of engineering more common as time goes on, despite the essential climatic difference from the Alpine regions and its influence on density of settlement.

Unit Track Renewal

A RADICAL departure from ordinary practice in railway maintenance-of-way work is seen in a method now employed to a limited extent in Europe by which the rails and ties are removed simultaneously in rail-length sections and are replaced by similar new sections, as described elsewhere in this issue. In American practice, rails are renewed continuously on long stretches of track, but the ties are renewed piecemeal or individually as wear or decay may require. Under these conditions, even though the rail in a continuous section of track should require entire renewal, a large percentage of the ties would still be serviceable and would be disturbed unnecessarily by out-of-face track renewal. Further, the European system of complete track renewal by rail-length sections requires rather elaborate and powerful machinery and equipment, a strange thing for European conditions of ready and cheap labor supply. On the whole, the only case where this system seems to have useful application to American maintenance-of-way practice is where the entire track is to be relaid or the type of tie changed.

Rolled Ballast

APART from the general merits or demerits of the European unit track-renewal system one feature, the use of a heavy roller for compacting the ballast, is suggestive of possibilities for use here. Rolling the subgrade is a promising means of reducing settlement in fills; it has been used successfully in highway work and has been advocated for some time for railway work but has been tried only on some recent construction. The universal method of compacting ballast in this country is to let traffic pass over the newly ballasted track for a few days before the final tamping and surfacing are carried out. There appears to be no reason why rolling should not be used to compact ballast on new track to reduce the cost and interference with traffic involved in the present procedure and to hasten the time when the final surfacing may be undertaken.

Again the Long-Time View

AGRICULTURAL ills have combined with a season of deficient water supply to place several California irrigation districts in serious financial difficulties. By-product power revenue has been so reduced by water shortage that bond-interest payments could not be met. The major instance was the defaulting in the July interest payment on the $16,000,000 of bonds by the Merced Irrigation District, fifth largest in the state and one of the most important. In this case negotiations between security holders and taxpayers give promise of showing a way out, by temporary reduction in interest followed by gradual increase during five years to bring it back to 5½ or 6 per cent, the bondholders in the meantime receiving most of the power revenue. Thus the uncertainty of the variable power revenue would be removed from the farmers and be assumed by the bondholders, and the initial taxes would be reduced by almost 50 per cent from the present $6 rate. The step is logical, for the bondholders have nothing to gain by pushing the farmers into bankruptcy.

But the case merits a word also on an underlying factor—the importance of a long-time outlook. A decade ago the Merced development seemed unusually sound and justified. Predictions that an agricultural depression might synchronize with a series of low-water years probably would have been ridiculed. Now, however, it can be seen that an irrigation project must be sound not only during the peaks of agricultural prosperity but also on the long-time average. Accordingly water supplies and the resulting power revenues are entitled to closer scrutiny in starting a project. Less optimism and more conservatism should find application to future irrigation development in the light of the present experiences.

Revetment Inventiveness Wanted

SUBAQUEOUS bank-revetting methods are open to improvement. River engineers agree in declaring that a less costly and more durable structure is required than the concrete and brush-mattress revetments used on the lower Mississippi, which are so costly—a third of a million dollars per mile of bank—that considering their uncertain durability extensive mileages cannot be justified economically. Yet effective channel control calls for extensive bank protection.

Present revetting processes are unsatisfactory not because they are failures but because they are too costly and too perishable. By and large the subaqueous revetments of the Mississippi and Missouri have retarded erosion and preserved property. They have not proved permanent; the cost of construction, replacement and upkeep is enormous.

River engineers have long recognized the need for new invention. The article by an old river engineer in this issue, as well as the prior articles which he cites, show that thought and ingenuity of high quality have been exercised.

Present revetment types offer little opportunity for cost reduction. Plant, material and labor costs cannot be greatly decreased—they are more likely to increase. Many river engineers consider, therefore, that the situation points directly to some other means of bank protection and channel regulation. What will it be? At present the only constructive effort is in the development of permeable wing dams or retards. In the upper Mississippi, and particularly between Cairo and St. Louis, these structures have performed a highly useful service. No one knows how efficient they will prove under the far more difficult channel and bank conditions of the lower river. The decision of the Mississippi River engineers to give them thorough trial is to be commended.

With the best channel-regulating effect that can be expected of wing dams, much bank paving will have to be built for many years to come. Hence one major problem of the moment is improved efficiency of revetment design and construction. This problem is a direct challenge to the ability of river engineers. Their skill and judgment in meeting the challenge, in going beyond present materials and construction methods, will be a prime factor in the advance of river-control work within the early future.

Grade-Separation Problems and Structures at Columbus, Ohio

Two railroads diverted for better grades and freight terminals—Viaduct required across state's property—Decorative treatment of track-elevation bridges

Fig. 1—Masking the steel girders of the Broad St. bridge with concrete allows harmonizing the span with the abutments

WITH thirteen railway lines converging within Columbus, Ohio, the problems of grade separation have been extensive and complicated. Track elevation is the main solution, but the impracticability of this plan in congested terminal and industrial districts has necessitated carrying several streets over the railways. Railway relocation is an unusual feature of grade separation in cities, but it was adopted on two lines at Columbus. In both cases it has improved the railroad's profiles, has eliminated the use of pusher engines in the yards and has permitted extensive enlargement of yards and freight terminals. Of special interest is the architectural treatment given to the track-elevation structures as a result of cooperation between the engineers of the city and the railway companies. —EDITOR.

RAILWAY RELOCATION, terminal improvements and track-elevation bridges of striking design are features of extensive grade-separation work completed in 1930 at Columbus, Ohio, by both the Norfolk & Western Railway and the Pennsylvania Railroad, with an aggregate length of 6 miles and a total cost of about $7,000,000. In both cases grades are reduced so as to eliminate the former use of pusher engines on the freight trains. These projects and the designs for structures were worked out by the railway engineers in conjunction with R. H. Simpson, city engineer.

General Situation—This city is served by six trunk lines, all passing through it, except that the Norfolk & Western makes this a terminal point. The others are the Pennsylvania, the Big Four, the Toledo & Ohio Central (New York Central system), the Chesapeake & Ohio and the Baltimore & Ohio. With their different divisions there are actually thirteen separate steam-operated lines radiating from the city, as shown in Fig. 3. All of them are served by one union passenger station. Studies for a general program of grade separation were started in 1908 by the city engineer, Henry Maetzel. In 1910 the Pennsylvania was raised from Spring St. west to the city limits, and the Baltimore & Ohio from Mound St. to the river; the Hocking Valley (now Chesapeake & Ohio) built subways at Dublin Ave. and Spring St., while four subways at Broad, State, Town and Rich Sts. were built on the parallel and adjacent lines of the Hocking Valley and the Toledo & Ohio Central.

In 1918 the Big Four raised its line from First Ave. north to Wyandotte St., about 2 miles; while in 1927 this road, the Pennsylvania and the Hocking Valley were elevated across Dension St., and the freight-house spur of the Pennsylvania paralleling Denison St. was elevated over Maple and Broadbelt Sts. In the southwest, where the Big Four crosses Broad St. (state route 40), the street was depressed in 1929 for 1,300 ft. and spanned by a through-girder double-track bridge having a length of 160 ft. on account of the skew crossing of the 60-ft. street. This project was handled in conjunction with the city and the state highway department.

Railway Bridges—The track-elevation bridges on the various lines include steel and concrete girder spans, concrete arches and a long concrete viaduct. Several of the structures are given special treatment for attractive appearance, the designs being subject to approval by the city engineer. Arch spans are unusual in such work, since generally it is necessary to keep the vertical distance between street and track at a minimum, so that there is insufficient headroom for an arch. But on the Pennsylvania the vertical distance is unusually great at two crossings, so that arches could be introduced with a minimum headroom of 5 ft. at the springing. It is of interest to note, however, that a relatively flat arch was successfully applied instead of the original girder design for a bridge on a spur track of the Chesapeake & Ohio entering the grounds of the Ohio State University, as described in *Engineering News-Record*, Sept. 24, 1925, p. 503. In place of the separate 36-ft. roadway span and 6-ft. sidewalk spans originally designed, there is a 48-ft. arch with 7-ft. and 13½-ft. headroom at ends and center respectively.

Street Bridges—Owing to the network of tracks, terminal facilities and industries along the adjacent or joint lines of the Pennsylvania and the Baltimore &

Ohio, from the union station eastward, it was impracticable to elevate the railroads; but grade crossings were eliminated by a series of eleven bridges carrying main thoroughfares across the tracks. Five of these are near the union station. A few other street bridges are provided where topographical conditions made this method logical. These street bridges are mainly steel-girder structures, designed and built by the city with approval of the railroads.

Future Work—Owing to the growth of the city, additional grade-separation projects under consideration include three on the Chesapeake & Ohio at King, Fifth and Third Aves.; two on the parallel lines of the Big Four and Pennsylvania at Oakland Park Ave. and Hudson St.; and four on the Cleveland line of the Pennsylvania at Fifth Ave., Seventeenth Ave., Hudson St. and Westerville Pike. Whether the tracks or streets will be elevated will be determined by study in each case.

Distribution of Cost—In all work of this kind in Ohio the railways and the city pay 65 and 35 per cent of the cost, respectively, except that on a state route, as at Broad St. and the Big Four Railway, the state may participate to the extent of 25 per cent, the city then paying 25 per cent and the railway 50 per cent. The Fair Grounds viaduct, described later, cost about $285 per linear foot. The relation of cost of paving and other incidental city work to total cost of structures is indicated by the accompanying table.

Norfolk & Western Railway

The Norfolk & Western, on the east side of the city, runs north across the joint main lines of the Pennsylvania and the Baltimore & Ohio, and then turns west into its freight yards at Joyce and Fifth Aves. Beyond the yards is a joint double-track line of this road and the Pennsylvania, over which passenger trains of the Norfolk & Western reach the union station (Fig. 3). An ordinance for track elevation was passed in 1911, and the plans were approved by the city council in 1914. Progress was delayed by controversy with the Ohio Electric Co. in regard to conversion of its overhead crossing at Main St. to a subway under the elevated tracks, but the World War put a stop to all improvement work. These original plans, for combined track elevation and street depression, gave the railroad little advantage, while the street subways would have had steep approach grades. Still worse, the grade crossing of the joint main line was retained.

As revised in 1922, the project was on a more extensive scale, including track elevation for about 4 miles from the south city limits to the Joyce Ave. yard, crossing all streets at such height as to require little or no change in street grades. An overhead crossing of the joint main lines was also included, but this necessitated a relocation to give the necessary headroom. However, this relocation had the important advantages of lengthening the Joyce Ave. yard, increasing its capacity from 1,500 to 3,750 cars, reducing the curvature at the east end of the yard from 8 to 4 deg. and putting the tracks at the same elevation as in the yard, thus eliminating the use of pusher engines, which had been required to get full tonnage trains in and out of the yards. It also eliminated the delays due to halting trains at the railroad crossing.

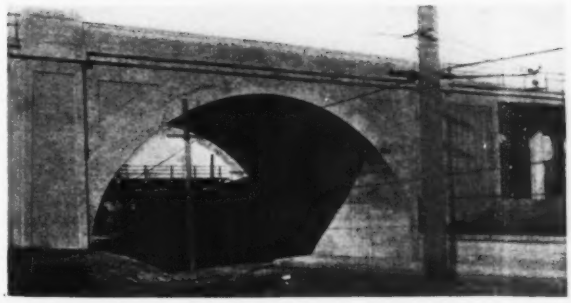


Fig. 2—Concrete arch and viaduct carry Pennsylvania Railroad over Eleventh Ave. and the State Fair Grounds

Beyond the arch is the older and lower track-elevation bridge of the Big Four Railway.

COST DISTRIBUTION ON TRACK-ELEVATION BRIDGES

Street	Railway	No. of Tracks	Street Width, Ft.	Cost of Structure	Cost of City Work
Broad.....	Norfolk & Western..	4	80	$87,000	$5,250
Main.....	Norfolk&Western....	4	80	68,000	11,300
Bryden...	Norfolk & Western..	4	70	46,000	7,600
Cleveland.	Pennsylvania.....	22	60	250,000	66,650
Eleventh..	Pennsylvania.....	4	60	72,500	*

* No street change.

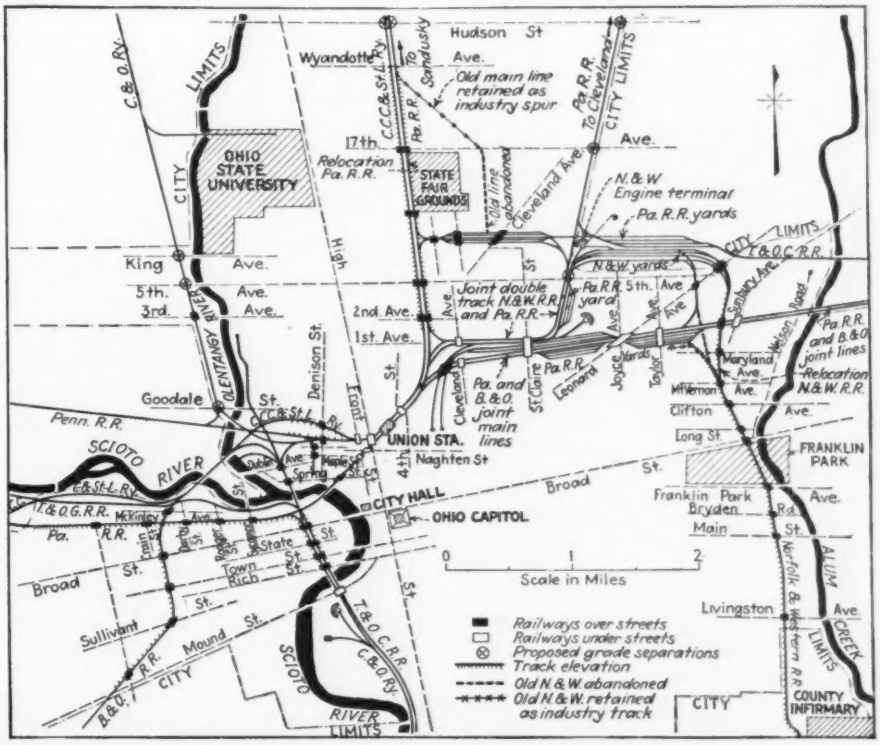


Fig. 3—Grade-separation developments at Columbus, Ohio

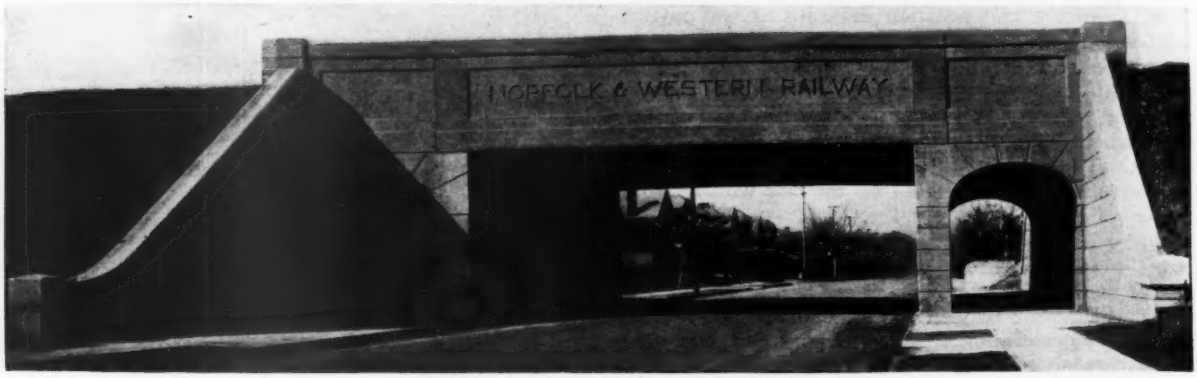


Fig. 4—In Bryden Road bridge the steel girders of the roadway span are concealed by concrete facia girders, while a concrete slab spans the sidewalks

Because of this yard extension 22 tracks are carried over the Leonard Ave. subway.

This plan, adopted in 1928, eliminated the railroad crossing and eight street crossings, besides opening two additional streets by subways for Clifton Ave. and Bryden Rd. For the first 2 miles, north to Fair Ave., there are three tracks, beyond which four tracks extend to the yard. All tracks have 130-lb. rails. The maximum grade northbound is now 0.4 instead of 0.7 per cent. Part of the old line south of the railroad crossing is retained for industry connections, being reached by an incline from the elevated tracks, but the remainder is taken up. Where the line crosses Franklin Park on a high fill, the slopes are dressed to about 1 on 3, covered with black soil and planted with shrubs specified by the city park department, which will also care for their maintenance. A fence at the top of the slope prevents trespassing. As the Broad St. crossing is convenient to the Port Columbus airport, it is provided with a platform and street stairway.

All the bridges are designed for Cooper's E-70 loading, and those over streets have an unusually elaborate architectural and decorative treatment in order to meet the city's requirements. A single span over the roadway and sidewalks is used at Broad St. (Fig. 1), while other streets have separate sidewalk spans, as at Bryden Rd. (Fig. 4.) The bridge over the Pennsylvania and the Baltimore & Ohio consists of five through-girder spans of 85 ft., with open-deck construction and a clear headroom of 25½ ft.

Broad St. Bridge—This is a steel plate-girder deck structure, masked by concrete-arched facia girders entirely independent of the steelwork and springing from abutments of conspicuous architectural design, as shown in Figs. 1 and 5. There are eight steel girders 88 ft. c. to c. of bearing pins and 8 ft. deep, spanning the 50-ft. roadway and 15-ft. sidewalks. They support a concrete deck that is built as four separate trough-shaped slabs, those for the two outer tracks having a 39-in. cantilever extension as a walk for trackmen. The ½-in. longitudinal joints are packed with waterproofing, while a three-ply waterproofing membrane, protected by 3 in. of concrete reinforced by wire mesh, is laid over the entire deck. The reason for this construction rather than a continuous flat-slab deck was to provide better drainage under the tracks.

Outside of the steel girders are reinforced-concrete girders, deep enough to serve as parapet walls and having the bottom chords curved to a 140-ft. radius, with a headroom of 9 ft. inside the sidewalk and 15 ft. at the center of the roadway. These girders, 36 in. thick, are anchored to the deck slab by steel bars. To insure good appearance, the concrete was made with fine aggregate and finished by grinding the exposed faces immediately after removal of the forms. Belt courses and the name of the railroad in large recessed letters relieve the flat surfaces, while the parapet wall has a coping and bush-hammered panels. Similar decorative treatment is applied to the abutments and approach walls.

Leonard Ave. Bridge—As this structure, at the end of the Joyce Ave. yard, carries a great number of tracks, its width between parapets is 400 ft. The 36-ft. roadway is spanned by 30-in. H-beams spaced 24 in. c. to c. and supporting a concrete slab 12 in. thick at the middle and 9 in. at the piers. Over this slab is a waterproofing membrane covered with 1 in. of concrete. The two 8½-ft. sidewalk spans are reinforced-concrete slabs, built monolithic with the abutment, curb pier and footing. The curb piers, 37 in. thick, are relieved by arched openings 71 in. wide and 9 ft. c. to c. These piers and the abutments are built in 98-ft. lengths, with ½-in. expansion joints. Ventilation of the roadway in this long subway is provided by three slots, 4 ft. wide, between the tracks. They are formed by carrying up the deck slab as curb walls 4 ft. high, the openings between them being covered with galvanized-iron gratings a little above rail level. In the roadway span the structural work is masked by a self-supporting concrete girder 18 in. thick, which forms a parapet wall and is anchored to the deck slab by horizontal stirrups. For the sidewalk spans the parapets are built as integral parts of the track slab.

Clifton Ave. Bridge—Here the sidewalk spans of 8 ft. 9 in. are similar to those of the Leonard Ave. bridge, but the roadway span consists of reinforced-concrete girders 6 ft. 10 in. deep, 40 in. thick and spaced 8 ft. 10 in. c. to c. to correspond with the columns of the curb piers. These girders are built integral with the 24-in. deck slab, and the two outer girders are carried up to form 4-ft. parapets. This construction is shown in Fig. 6. An unusual feature is that one side of the bridge carries an inclined industry spur below the level of the main tracks. To avoid carrying the concrete up to full height, the bridge deck is at the level for the spur track, and the main tracks are raised 10 ft. above it by an 8-ft. fill with 2 ft. of ballast.

Fair Ave. Bridge—Another variation of the type of structure used in the Leonard Ave. and Clifton Ave. bridges consists of deck plate girders, two to each track, for the 36-ft. roadway span at Fair Ave. This is in combination with concrete spans over the 12½-ft. side-

walks, these latter giving clear openings of 8 ft. 8 in. On the girders are separate single-track slabs for the tracks, as on the Broad St. Bridge. Concrete girders, anchored to the deck slabs, mask the structural work.

Engineers and Contractors—Work was begun in October, 1928, and completed in October, 1930, at a total cost of about $4,000,000. It was done under the direction of W. P. Wiltsee, chief engineer of the Norfolk & Western Railway, with C. E. Armstrong, assistant engineer, in charge. The contractors were Morris, Gray & Hunter, Roanoke, Va., for the track elevation, and H. M. Waugh, Bluefield, W. Va., for the line change and yard extension. Track work was done by railroad forces. For the 3 miles of elevation on the original location the two main tracks were separated temporarily and laid along the right-of-way lines, leaving the space between them clear for the masonry construction and earthfilling. For this part of the work the railroad paid 65 per cent and the city 35 per cent, according to the state law, but for the new or relocated line the railroad paid the entire cost.

Pennsylvania Railroad

Of five lines of the Pennsylvania system radiating from Columbus, the one west to St. Louis was elevated in 1910 from the Scioto River to Central Ave., about 1½ miles. More important, however, is the elevation and relocation of the line running north to Sandusky, which was completed in 1930 and included extensive improvements to the freight yards. Originally the line passed around the east side of the State Fair Grounds at street level (Fig. 3), while on the west side this property was flanked by the Big Four Railway, which was elevated for normal headroom over the streets.

Relocation and Track Elevation—In connection with its grade-separation project, the railroad desired to shorten its line by relocating it adjacent to the Big Four Railway and thus also permit extension of its Grogan freight yard. Permission to build across the fair grounds was granted by the Ohio Department of Agriculture upon condition that a viaduct should be built, permitting the space beneath it to be utilized and retaining access from the grounds to the Big Four Railway.

This relocated line, with four tracks throughout, extends from Fifth Ave. north to Wyandotte Ave., about 2 miles, with a maximum grade of 0.3 per cent, compensated. Except for the viaduct (Fig. 2) the line is on a fill; but as its right-of-way adjoins that of the Big Four Railway, whose tracks are at a lower elevation, a concrete retaining wall is required along the west side of the Pennsylvania fill. As with the Norfolk & Western relocation, described above, part of the old line was retained to serve industries (Fig. 3), but the remaining part was taken up, thus removing street grade crossings and permitting an extension of the Grogan yard and Joyce Ave. receiving yard, which about doubled their car capacity and gave tracks long enough to accommodate full trains. Subways at Cleveland and Essex Aves. carry 22 tracks over the streets. An important advantage from the change of grade was that northbound freight trains could be pulled out of Grogan yard by the road locomotives, while formerly pusher engines were required on a grade of about 0.8 per cent to the main line.

Four-Track Concrete Viaduct—This structure (Figs. 2 and 8), crossing the State Fair Grounds for 2,462 ft., was designed to meet the imposed conditions noted above, and the ground beneath can be used for cattle-pens or

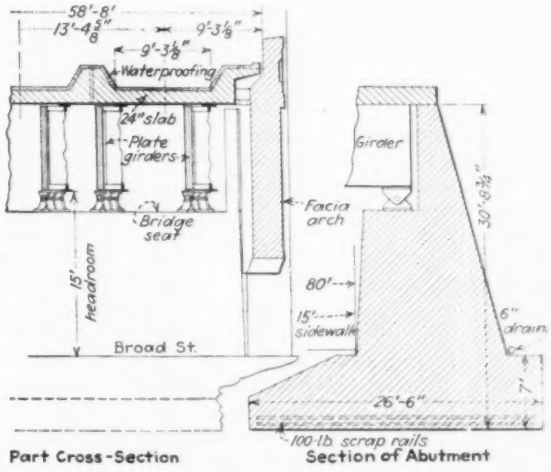


Fig. 5—Details of Broad St. bridge of N.&W. Railway, showing concrete facia girder

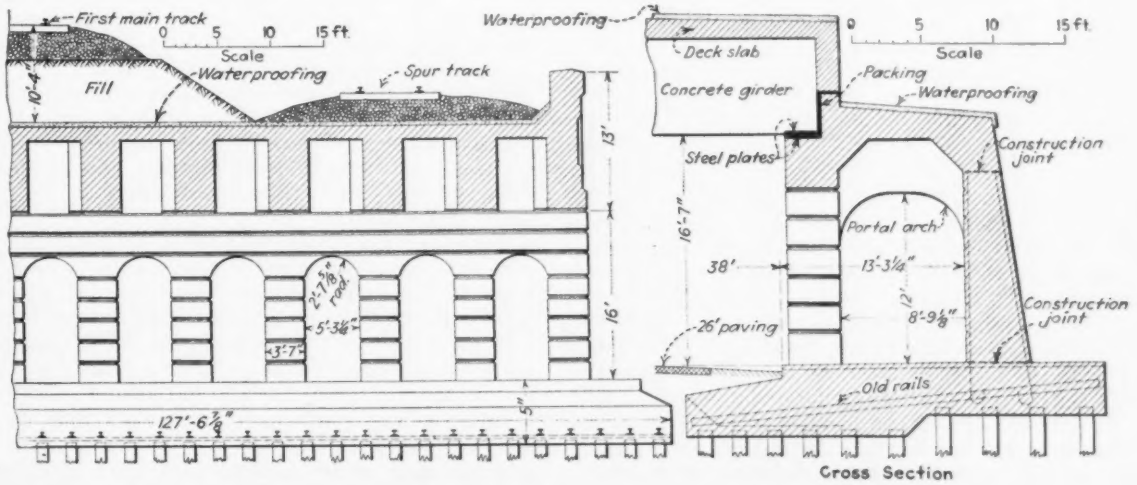


Fig. 6—Saving was effected in the Clifton Ave. bridge by placing deck at level of an inclined spur track and raising the main tracks to grade by means of fill

other purposes. It is of the flat-slab type, with three-column bents, the columns (21 ft. c. to c.) having flaring caps and drop panels supporting a deck 60 ft. wide. It is built in six-span lengths of 127.37 ft., separated by 2-in. expansion joints. In each section the two end spans are 20 ft. and the four intermediate spans 21 ft. 2¾ in. c. to c. On the 24-in. deck slab is a 2-in. waterproofing layer composed of a two-ply membrane protected from the track ballast by a coat of 1:4 cement mortar reinforced with wire mesh.

At the expansion joints two water-stops are formed by sheets of $\frac{3}{16}$-in. lead bent in channel shape and extending across the opening, the web being buckled to allow for expansion and contraction movements, while the ends are anchored in the concrete. One plate is at mid-depth and the other at the top of the slab. As the waterproofing layer is stopped at each expansion joint, the slot is covered by a ¾-in. steel plate 18 in. wide. Short bolts in this plate have nuts on the under side, which lie in the slot and thus anchor the plate in place. The top of the slab is formed in drainage planes that converge over two of the middle columns in each 127-ft. section. In these columns are embedded 4-in. downspouts of cast-iron pipe, with screen boxes on top, surrounded by the stone ballast. Their lower ends lead to catchbasins on a 12-in. pipe drain, which extends under the entire length of the viaduct and discharges into a city sewer.

For good appearance the columns, drop panels and sides of the slab were finished by rubbing with abrasion bricks accompanied by cement grout. A hand railing of 2-in. pipe is erected on each side. In the curb that retains the ballast are embedded 3-in. fiber ducts for electric wires and cables. These ducts have sleeve connections at the expansion joints, while at intervals of about 445 ft. there are splicing chambers 1½x5 ft., having iron covers and drained to the downspouts by 3-in. pipes. For the columns and deck a 3,000-lb. concrete was specified. The soil is mainly clay, hard clay being reached at about 18 ft. and continuing to the full depth of 60-ft. borings. Concrete cylinder piers are carried to an average depth of 25 ft. and are belled out to a base diameter of 10 ft. for an average load of 4 tons per square foot on the clay. For the intermediate columns the piers are 51 in. in diameter, but at the expansion joints three piers 5 ft. in diameter, with 6-ft. caps 5 ft. deep, carry the divided or twin columns.

Concrete Arches—Limited headroom usually prevents the use of arch bridges on track-elevation work, as already noted. But owing to the elevation required across the State Fair Grounds, the Pennsylvania Railroad crosses Eleventh and Seventeenth Aves. at heights of 33 ft. 2 in. and 27 ft. 9 in., respectively. At each street there is a barrel-arch bridge of 60-ft. 6-in. clear span over roadway and sidewalks. The clear headroom at the center of the span is 28 ft. 10 in. at Eleventh Avenue and 22½ ft. at Seventeenth Ave. These arches form the ends of the viaduct, and beyond them the line is on a fill. The Eleventh Ave. arch is shown in Figs. 2 and 7.

For the Seventeenth Ave. arch the central portion has a radius of 42 ft. 3 in., which is reduced to 32 ft. 8¾ in. near the ends and then 9 ft. 2 in. to the spring line, which is 4 ft. 8 in. above the sidewalk. For four tracks the width of bridge is about 60 ft. The arch ring is 2½ ft. thick at the crown and increases gradually to 7 ft. at the bearings against the massive concrete abutments, which serve also as footings to support the retaining walls of the approach. These footings are seated in the hard clay formation, and no foundation piles are used. Parapets 2½ ft. high retain the fill and 18 in. of stone ballast, which is level with the parapet and the tops of the ties.

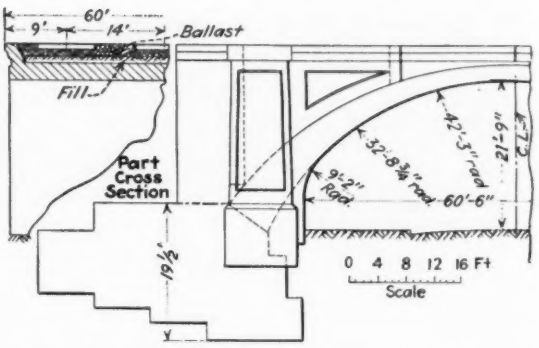


Fig. 7—Details of Pennsylvania's concrete-arch bridge over Eleventh Ave.

A view of this structure is shown in Fig. 2.

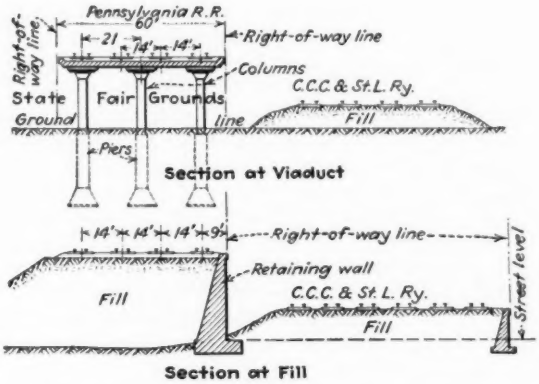


Fig. 8—Track elevation of adjacent railroads near fair grounds

The Big Four Railway is elevated for minimum headway over streets (Fig. 2). The Pennsylvania Railroad is elevated higher to permit use of State Fair Grounds under the structure and to avoid blocking access to the Big Four.

Concrete, mixed according to the water-cement theory, was designed for a compressive strength of 3,000 lb. for the arch barrels and 2,500 lb. for other parts. Over the extrados is laid a two-ply waterproofing membrane protected by a 1½-in. layer of 1:4 cement mortar reinforced with wire mesh. On this and over the abutments is an 18-in. bed of gravel or other porous material for drainage. Exposed surfaces, except the intrados, were rubbed with brick and given a wash of cement. The street faces are relieved by bush-hammered panels on the abutments, spandrels and parapets, and by the name "Pennsylvania" in large recessed letters in the middle panel of the parapet.

Engineers and Contractors—This relocated line, with yard extensions and other accessory improvements, was designed and built under the direction of I. W. Geer, chief engineer, Pennsylvania Railroad (Western Region). The structures were designed by E. Weidemann, engineer of bridges and buildings. For the concrete viaduct and arches the contractor was the John F. Casey Co., Pittsburgh, Pa.; grading and track work were done by the Ferguson & Edmondson Co., Pittsburgh, Pa. The three subways under Grogan yard were built by the Fritz-Rumer-Cooke Co., Columbus, Ohio. The cost of the entire improvement was about $3,000,000.

Swiss Methods of Avoiding Silt Deposits in Reservoirs

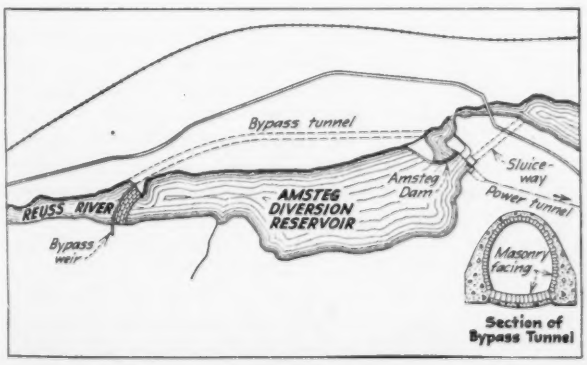
Tunnel bypassing debris-laden floods maintains reservoir capacity—Granite invert erodes inch in six years

By OREN REED
St. Paul, Ind.

DEBRIS deposition in reservoirs has recently received special attention in the United States, particularly in the West. Small diversion reservoirs on power and irrigation projects give the most trouble in this respect, due to the serious decrease in useful capacity and the ultimate inadequate pondage, causing silt and debris to be carried into the conduits. It is therefore of paramount importance that the permanence of a reservoir be protected wherever possible through bypasses, sluiceways or whatever provisions will best meet the silt problem. European methods of eliminating debris deposition have been studied by the author at first hand, and a brief general description of typical practices is presented in the following.

All rivers carry silt and debris to a greater or lesser degree, and since the transporting power of running water varies nearly as the cube of the velocity, mountain streams are most heavily charged with debris during certain seasons of the year. The particles that constitute debris, irrespective of their source, have the common characteristic of becoming smaller as they move from the source to the mouth of the stream. The larger component parts roll along the bottom and are reduced in size by abrasion and impact. The finer particles are carried principally in suspension, and particles of considerable size can be transported by turbulent water in this manner.

When a dam is constructed on a mountain or piedmont stream, the reservoir will be gradually filled up by debris deposited as a delta at the head of the pond and by silt dropped due to the decreased velocity of the water. The debris deposit advances steadily as a true delta formation, while silting over the entire reservoir area begins immediately after completion of the dam. The thickness of the silt layer deposited annually, however, is not the same over the whole pond. Most of the silt is deposited near the head of the reservoir, the layer decreasing in thickness toward the dam. Silt and debris are usually difficult and costly to sluice out of a reservoir, even when the proper facilities have been provided to cope with the problem. In practice it is usually only feasible to keep the intakes reasonably clear; and where the intake structure has been located at some distance from the dam, adequate cleaning is often impossible.



Scheme for bypassing silt-laden floors at Amsteg

Tunnel capacity of 7,800 sec.-ft. is sufficient to bypass all but extreme floods.

The transportation and deposition of debris presents a problem that may destroy or seriously impair the value of a reservoir. The possibility of finding a feasible solution justifies considerable attention, especially on mountain streams, during the layout of the reservoir and the design of the dam. It is general practice in Switzerland and in Alpine portions of Germany and Italy to protect the unstable banks of streams with carefully built masonry walls. In some cases the bottom of the stream is paved with masonry and most of the fall concentrated in regular steps. Bank and bottom revetments decrease the debris load of a stream to a certain extent. Two practical solutions of the silt problems in Swiss reservoirs are outlined below.

Amsteg—The Amsteg project, completed in 1922 to provide power for electrification of the Mt. Gotthard section of the Swiss Federal Railways, is a streamflow plant on the Reuss River and operates in parallel with Ritom, a storage plant. The Reuss is a flashy mountain stream whose flow varies from a minimum of 70 sec.-ft. to a floodflow of 14,000 sec.-ft. The drainage area above the diversion point is about 156 square miles.

The diversion dam, in the Pfaffensprung gorge, is an arch of cut-stone masonry, with a height of 105 ft. and a storage capacity of 160 acre-ft. The streamflow up to about 7,800 sec.-ft. may be diverted around the pond by means of a tunnel 1,000 ft. long. A massive cyclopean masonry weir with rounded crest 140 ft. long diverts the flow into the bypass tunnel. Flow through the tunnel is regulated by two electric motor-operated inlet gates, each 17.7 ft. wide, so that the flow into the pond is only sufficient to supply the plant demand. The bypass gates are kept closed during the low-water season, and thus during this period the entire flow passes directly into the pond.

During the low-water season, when the full flow is utilized through the plant, little silt or debris is carried by the stream. During flood periods about one-third of the total flow passes through the pond and is spilled over the dam. However, this is that part of the streamflow near the surface carrying only silt and fine sand, while the larger part of the flow, heavy in debris, is bypassed through the tunnel. Observations made after three years' operation show that deposition in the pond has been insignificant. Absence of abrasive cutting on the nozzles of the impulse wheels also indicates sufficient pondage to clarify the water. The frequency of floods on the Reuss is, on the average, so small that many years, perhaps decades, will pass before sluicing will be necessary.

The bypass tunnel has a nominally clear cross-section of 225 sq.ft., gradually enlarged in the upper 115-ft. length to an inlet area of 710 sq.ft. An S-shaped drop of 19.6 ft. immediately back of the inlet gates produces acceleration, giving a high hydraulic capacity to the tunnel, which has a constant slope of 3 per cent below the inlet drop. Only the last 121 ft. of the tunnel is located in solid granite, the remainder passing through talus and debris. The debris formation was largely stream-deposited and made construction costly and difficult.

Much study was given to the lining of the bypass tun-

nel. Local soil conditions determined the tunnel section, and a high velocity was necessary to obtain the required capacity. The velocity at maximum flow is nearly 50 ft. per second. The estimated quantity of debris carried through the tunnel is more than 130,000 cu.yd. per year (concentrated in about three months). It was decided to face the floor with granite blocks, 20 in. thick, set on a 12-in. concrete base. The joints are about 0.5 in. wide and pointed with a rich mortar. Side walls are constructed of concrete or masonry, and the arch roof is of stone masonry. Measurements made after six years' service show that the average erosion of the granite floor in straight sections of the tunnel was about 0.16 in. per year, being considerably greater at the foot of the inlet drop and at the curve in the tunnel axis. The strong erosive action of the quartz sand was especially noticeable in the longitudinal joint, where the mortar was deeply eroded, while the transverse joints were hardly affected. After experimenting with different materials in the longitudinal joints, flat steel bars in a mortar bed secured by oak wedges proved entirely successful.

Waeggital—On the Waeggital project, described in *Engineering News-Record*, Sept. 9, 1926, p. 410, and Nov. 3, 1927, p. 723, a silt problem at the Rempen equalizing and diversion reservoir was solved by proper study of the reservoir location with respect to the relative debris load carried by two streams. The drainage area tributary to the Aa River is comparatively small between the Rempen power house and the main storage at Innertal Reservoir. The runoff, and therefore the debris load, is not great. The Trebsen Brook runs into the Aa River a short distance below the Rempen plant at the location of the proposed equalizing reservoir. This tributary is a typical mountain torrent, carrying a heavy debris load during the runoff season. Since it was desirable to make use of the flow of Trebsen Brook and, at the same time, to prevent excessive debris deposition, Rempen Dam was located immediately above the junction and the desilted portion of the stream carrying the larger amount of debris is diverted through a 985-ft. tunnel into the reservoir. This tunnel has a capacity of 225 sec.-ft., and the average annual diversion is 11,000 acre-ft. The Trebson diversion weir has sluiceways to prevent debris from being carried into the Rempen reservoir.

Check Dams Control Debris Movements on Mountain Streams

Damage from debris carried onto valuable land largely eliminated by construction of inexpensive dams to form stilling pools

By L. M. WINSOR

Irrigation Engineer, U. S. Bureau of Public Roads, U. S. Department of Agriculture, Logan, Utah

RECENTLY a series of devastating floods occurred over a portion of the intermountain states, being particularly destructive along the western slope of the Wasatch Mountains in northern Utah. Many homes were destroyed and a considerable area of valuable truck farm and orchard land was laid waste. The only interstate highway leading to the north from Salt Lake City was blocked five times within a period of six weeks. Railroads and interurban lines were tied up and were put to heavy expense in clearing away flood debris and rebuilding tracks.

The damage sustained by these floods justifies the initiation of an intensive study of the entire flood problem to determine, first, how further loss of life and damage to property may be prevented and, second, to what extent such floods as these may be eliminated.

Fig. 1—Debris spread over its banks by Parish Creek

The school house in the center was filled to above the level of the first floor.

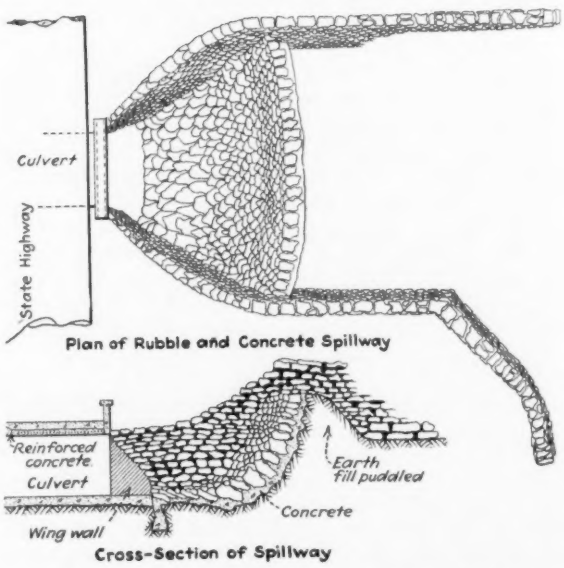


Fig. 2—Spillway in flood barrier at Willard, Utah

The division of agricultural engineering, Bureau of Public Roads, began an investigation in 1922 to determine how mountain streams may be controlled during periods of high water. The primary object of the study was to discover an economical means of separating the waters from their burden of debris in order that the water might be used for irrigation without the ditches becoming clogged with sand, gravel and boulders. The immense quantity of such materials carried down during high floods is shown graphically in Fig. 1.

The first attempt at control was made on a stream that is subject to frequent torrential floods. All the water is needed for irrigation, but prior to 1922 much of the spring runoff was lost because of sand and gravel that filled canals and ditches when attempts were made to use the water.

Two control structures were installed in 1922 at a total cost amounting to only half the cost of cleaning

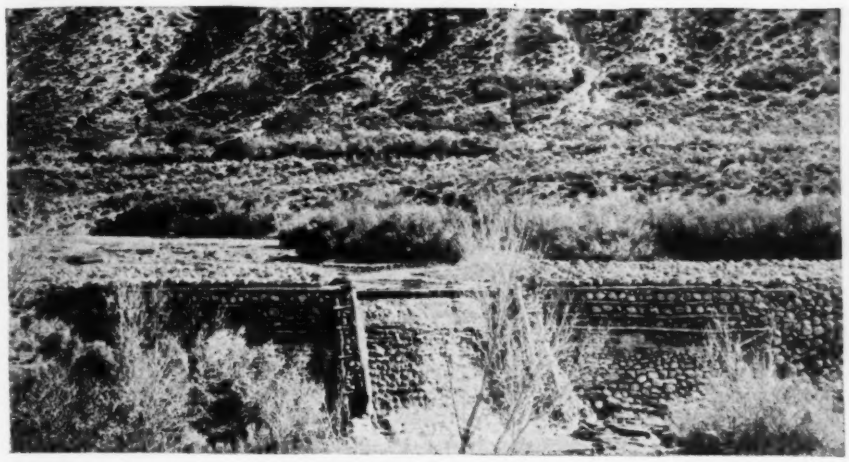


Fig. 3—Flood barrier at Manti, Utah

gravel from canals and laterals during the previous spring. The structures were successful in freeing the stream completely of sand, gravel and boulders. Further expense for cleaning the canal system was, therefore, practically eliminated. The control works have been in operation for nine seasons and have been remarkably efficient.

Some idea of the character of the control works built across these mountain streams may be had from Figs. 3, 4 and 5. These structures have been subjected to frequent tests from torrential floods as well as from the high water each spring caused by melting snow. In 1923 and again in 1930 the summer floods were exceedingly violent, but the control works withstood the tests, thus furnishing conclusive proof of the practicability of these structures.

The control works adopted are extremely simple. A gravel barrier is constructed across the streambed at a location such that the stream above the barrier may spread over an area several times the normal width of the channel. This results in retardation of the velocity of the water some distance above the barrier and produces a pond of still water immediately above it. The stream commences to unload its burden at the point where it begins to widen, and by the time it reaches the spillway the heavier debris has been deposited. The water impounded behind the barrier acts as an equalizing reservoir and lowers the peaks of the floods.

The accompanying sketch (Fig. 2) shows in detail the spillway through the barrier at Willard, Utah. This structure is located immediately above a culvert under the highway. The barrier extends 7,000 ft. along the highway and 3,000 ft. above it to the mouth of Willard Canyon.

There were no natural banks on either side to serve as lateral extremities of the barrier. The ground covered by the barrier was left with its boulder-strewn surface 8 to 12 ft. higher than adjacent land. The embankment that surrounds the lower three sides has been raised a little at a time as material with which to build has been washed into place. In fact the flood stream has been diverted in its course and made to unload its burden virtually in place around the margin of what is now a settling basin. Year after year the outer portion has been raised until it is 10 ft. higher than the inner area. This provides against the hazard of a torrential flood, which, when forced to spread out, loses its force.

The spillway in the channel, which collects the water after heavy debris has been deposited and passes it under the highway and into the irrigation system below, is built of boulders from the flood deposits. These are held secure by concrete. The grout used serves only as a bedding medium to fill the space between and around the lower two-thirds of the boulders. Rock is laid upon rock rather than in mortar, as is the customary practice in masonry, in order to provide greater stability. The outer one-third of each boulder in the floor of the spillway is left exposed to take the wear and sand or fine gravel that the stream may carry if the crest is not sufficiently high. The exposed boulders also serve to break the velocity of the stream, thus preventing erosion at the lower toe.

The crest of the Willard structure has been raised twice in order to provide a stilling pool immediately

Fig. 4—Spillway in barrier at Farmington, Utah

Fig. 5—The Farmington barrier after the high water in 1927
The crest of this barrier has been raised twice.

above, which is required for the complete unloading of the debris at flood time.

Since 1922 twelve additional mountain streams in Utah with varying characteristics have been controlled in a similar manner; and in each case further property damage from floods have been prevented, although several of these streams were subject to extremely high water in July and August of last year.

Stormwater Pumps Drain Levee District at Dallas, Tex.

Use of borrowpits as storage basins for rainfall permits reduced capacities of five pumping plants—Motor-driven screw pumps and vertical-shaft centrifugal pumps

By ALBERT S. FRY
Assistant Engineer, Morgan Engineering Co., Memphis, Tenn.

CONSTRUCTION of a leveed floodway in the Trinity River valley at Dallas, Tex., by the Dallas Levee Improvement District necessitated provision for stormwater drainage discharge into the reclaimed area. The city voted bonds to construct pressure storm sewers for three city drainage areas and to construct, jointly with the district, a combination retarding basin and pressure outlet sewer for two other city areas. For the remaining 36 square miles, divided into five areas, the district has provided drainage by gravity in sluiceways through the levees, supplemented during high water in the floodway by pumping plants operating in conjunction with temporary storage in the reclaimed area.

Design of Drainage Works—In this reclamation and flood-protection project (*ENR*, Nov. 21, 1929, p. 804; and Jan. 22, 1931, p. 158) some 20 miles of parts of the old river channel remain within the reclaimed area and are available as storage basins to hold a quick runoff until the sluiceways or pumps can discharge the stored water. Continuous borrowpits for the levees increase the storage-basin capacity. The utilization of the borrowpits and old channels materially reduced the cost of drainage works. One relatively small drainage area has so much storage available that a sluiceway affords complete protection. Four areas that require pumping plants in addition to sluiceways have areas of 2.3, 3.3, 5.9 and 25 square miles.

Although records of river stages had been kept in Dallas back to 1903, construction of the floodway so altered conditions of flow that these heights no longer applied. This made it necessary to calculate rating curves for the new floodway at each pumping station site, preliminary to a study of runoff and pumping. From the daily records of rainfall and river stages all periods of coincident rain and high water were located, and river stages for such periods were converted into discharges based on the existing rating curve. Stages in the new floodway corresponding to these discharges were determined from the calculated rating curves at each pumping-station site.

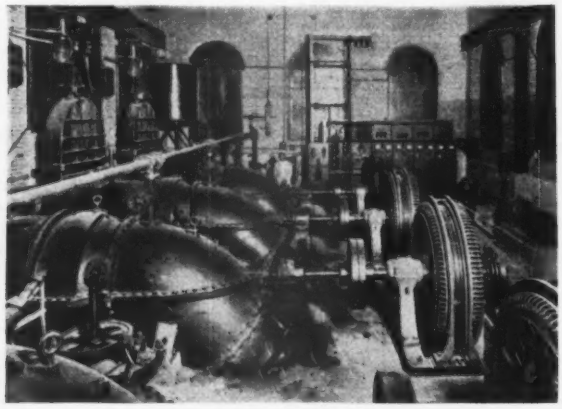


Fig. 1—Four 54-in. screw pumps handle stormwater

Fig. 2—Stormwater pumping plant in levee

Conduits form sluiceway for gravity flow and carry pump discharge during floods. View taken before backfilling. Note cutoff walls to prevent seepage.

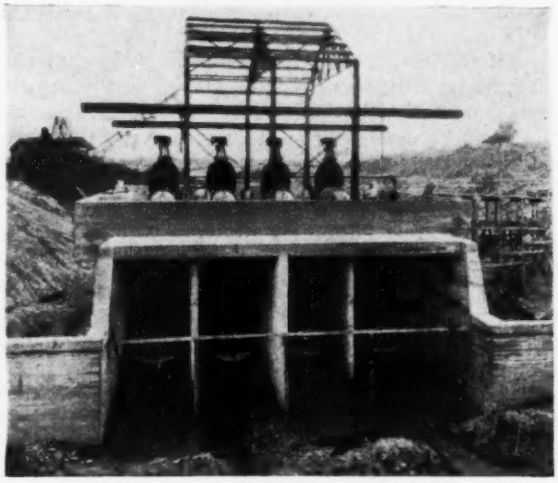


Fig. 3—Suction bay for screw pumps

Runoffs for each pumping area for each storm were calculated. For built-up areas 10 per cent of the rain was assumed as lost by absorption and evaporation and the remaining 90 per cent as runoff, 75 per cent occurring on the day the rain fell and 25 per cent being retarded one day and added to the next day's runoff. For outlying sparsely settled areas a 25 per cent absorption-evaporation loss with 40 per cent retardation was used.

Storage-capacity curves for old channels and borrowpits were drawn, and limits were fixed for both top and bottom storage. The storage volume was a fixed quantity, as these basins are subject to practically no variation. Discharge curves representing several different pump types and capacities were tested for each of the stations by routing the storm runoff through the storage basins and pumping plants during the coincident periods of flood for the 27 years of record, using the previously determined elevations in the new floodway for the discharge bay. This process determined the pump capacity and characteristics, which, combined with the storage, would prevent flooding from interior runoff.

The results of the storm routing showed that generally

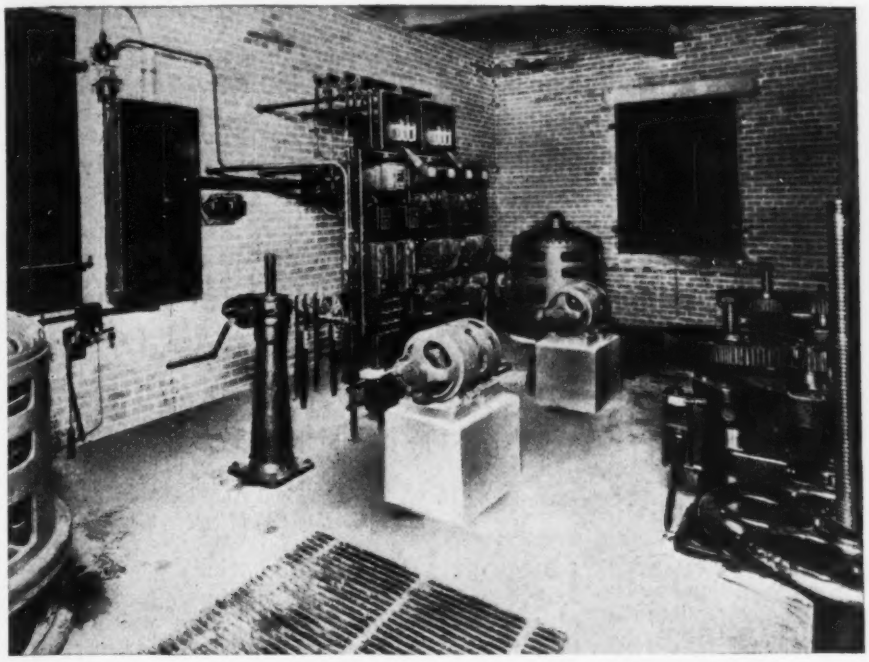


Fig. 4—Small pumping plant has vertical-shaft pumps

maximum flood heights and rainfall over and near the city were not coincident. Above Dallas there is a pear-shaped drainage area of 6,000 square miles on the two forks of the Trinity, and it is about 125 miles to the head of this area. As the general direction of storms is from the southeast, rainfall usually occurs first in Dallas and then follows up the drainage basins. This leads ordinarily to the discharging of the local runoff before the river-flood runoff has time to reach the valley opposite the city. Calculations based on past records indicate that on the average the pumps will operate only a relatively small percentage of the time, gravity drainage being mainly available. A future rather than a historic viewpoint was used as the true gage of actual operation, since knowledge of the future occurrence of rain is necessarily unknown, and some pumping must be done to make storage potentially available for runoff from possible rain that may never occur.

To develop maximum storage for the largest area, the old river channel was divided into two sections by an earth dam, water being stored several feet higher on the upper side. Flow in a concrete conduit extending through the base of the dam is regulated by electrically operated sluice gates with automatic float-switch control.

Pumping Machinery— The largest pumping station (Figs. 1 to 3) has four 54-in. horizontal-shaft screw pumps, each operated by a 350-hp. synchronous motor, with a total station capacity of 200,000 g.p.m. at the average working dynamic head of 17 ft. Two vacuum priming pumps are each capable of priming the four pumps. For each of the three small stations (Fig. 5 the pumping equipment consists of duplicate units of vertical-shaft open-suction motor-driven pumps installed in wet pits. At one station the pumps are 18 in. in diameter with 80-hp. motors; the other two stations have 24-in. pumps with 125-hp. motors. Total dynamic heads average about 15 ft., and station capacities at this head are 20,000 g.p.m. for the smallest station and 42,000 g.p.m. for each of the other two plants. These pumps are self-priming.

Each pumping station is on the berm of the land side of the levee and directly over the intake end of the concrete sluiceway for gravity flow, the sluiceway being used economically for the pump discharge. Gravity drainage through the sluiceways is controlled by electrically operated back-pressure gates, in preference to face pressure gates with stuffing boxes or high operating wells. Each pump-discharge line is equipped with a gate valve. Each wet-pit pump unit operates independently, and each pump chamber is fitted with a hand-operated sluice gate, so that it can be isolated. On the outlet end of the sluiceways for the smaller stations, automatic gates prevent quick rises from backing into the basins.

For economy the size of building was minimized by compact arrangement of the machinery. Non-rising stem-gate valves were used on the screw-pump discharge lines to reduce building height and to avoid interference with

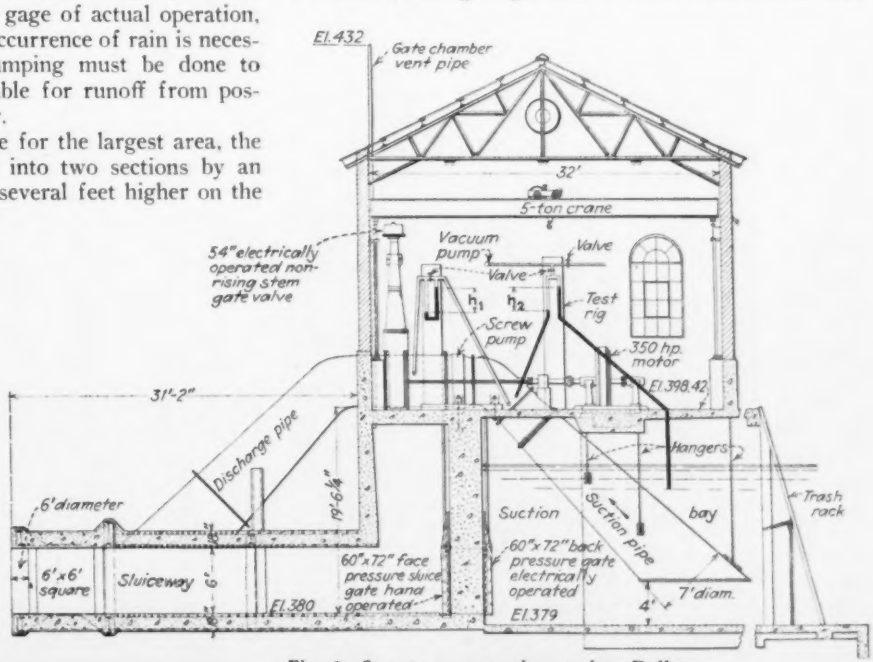


Fig. 5—Stormwater pumping station, Dallas

This is the largest of five plants. Note equipment for performance tests.

the traveling crane. Manually operated emergency sluiceway gates protect the large station from backwater flooding in case the main gates should fail to close. This station is manually operated. At all stations the suction bay is protected by welded bar trash racks, made in vertical sections for ease in cleaning.

All transitions in size of pump lines and waterways were so made that velocity head is regained, except where initial velocities are already low. Entrance and discharge velocities for suction and discharge pipe were held to a maximum of 4 ft. per second, and sharp turns or bends in the lines were avoided. On the large station the noses of supporting walls in the suction chamber and sluiceway were made lens-shaped to prevent loss of head.

Automatic Control of Pumps—To take full advantage of gravity drainage at the automatically controlled wet-pit plants and so avoid unnecessary pumping involves somewhat complicated control conditions, which have been met by the combination of float switches and a special differential mercury control switch. The top element of the switch is connected with the discharge water by a ¼-in. copper tube extending through the levee, while the bottom element is connected with the suction bay by a similar pipe. Normally the sluice gate controlling the gravity sluiceway is open. When water rises in the discharge higher than in the suction, the pressure on the top element closes an electrical circuit, which closes the gravity sluice gate, which in turn closes a switch on the pump circuit. But the pumps do not start until the suction rises above a predetermined elevation, when the float switch finally closes the circuit to start the pumps.

Should the discharge become lower than the suction, the balance of pressure is reversed, thus reversing the differential switch, opening the pump circuit, stopping the pumps and restoring the original circuit, which opens the sluice gates. With the discharge higher than the suction, if the latter is pumped down to the predetermined elevation, the float switch falls and opens the circuit so that the pumps cut out. This control is sensitive to slight differences in water level.

Construction Work—Rough excavation for the sluiceways was made by dragline machines that constructed the levees. Fine excavation to exact grades was done by hand. The large station and one of the smaller stations were founded on shale, the other two on stiff clay. Careful formwork for interior concrete surfaces of sluiceways insured a smooth waterway. Cutoff walls to prevent seepage along the barrels are 20 ft. apart and 3 ft. wide, as shown. Backfill was placed by dragline machines, and the levee was constructed over the sluiceways. All the pump houses have reinforced-concrete substructure and plain brick superstructures. Interior iron shutters prevent theft when the stations are not operating. Performance guaranteed tests are described in a following article.

Engineers and Contractors—The Morgan Engineering Co., Memphis, Tenn., is consulting engineer for the district and designed the pumping plants. Ned. H. Sayford is in charge for this company, and the writer is assistant engineer. R. E. Hutchins, now professor of civil engineering at Rose Polytechnic Institute, and J. H. Wilkinson were enaged on the hydraulic and structural designs. Myers, Noyes & Forrest, Dallas, Tex., are the district engineers. H. W. English was resident engineer and representative of the consulting engineers. B. F. Williams, state reclamation engineer, approved the design and construction. The Trinityfarm Construction Co., Dallas, Tex., is general contractor. Substructures were constructed by the Janes Contracting Co., and the buildings by the Eckert-Burton Construction Co., both of Dallas. Pump tests were under the joint direction of H. W. English, representing the consulting engineers, and R. K. Annis, testing engineer for the manufacturers, Fairbanks, Morse & Co., Chicago, assisted by F. A. McCaughan, representing the district engineers.

* * *

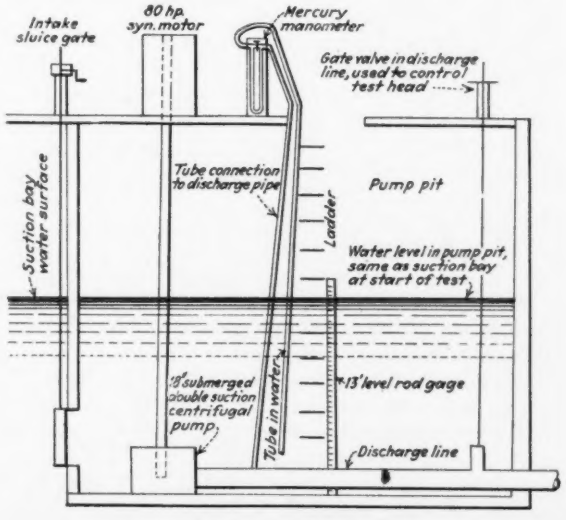
Testing Stormwater Pumps by Novel Method

In absence of flood a discharge head was created by throttling pump-discharge pipes

By H. W. ENGLISH and ALBERT S. FRY
Morgan Engineering Co., Memphis, Tenn.

PERFORMANCE TESTS of the pumping plants described in the previous article were made by somewhat unusual methods. Rather than wait until the weather produced high-water heads for testing under actual operating conditions, the heads were built up by throttling the gate valves in the pump-discharge lines. With the wide and deep inlet and outlet channels, the construction of even temporary weirs or flumes for measuring discharge would have been costly, so that less expensive methods were employed.

For testing each centrifugal pump the set-up was as shown in the accompanying illustration. The pit was filled to the level of the water in the suction bay through the sluice gate on the pit, this gate then being closed. The capacity of the pump during a test was measured volumetrically by observing the drop in water surface in the pit over an observed time. The head pumped against was artificially made by throttling the discharge-gate valve. Each pump was tested for heads ranging from 10 to 45 ft. The head was measured by a mercury manometer, one side being connected into the pump-discharge pipe and the other side directly into the suction


Intake sluice gate
80 hp. syn. motor
Mercury manometer
Gate valve in discharge line, used to control test head
Tube connection to discharge pipe
Pump pit
Ladder
Suction bay water surface
Water level in pump pit, same as suction bay at start of test
18" submerged double suction centrifugal pump
Tube in water
13' level rod gage
Discharge line

Test rig for centrifugal pumps

Test rig for 54-in. screw pumps is shown in Fig. 5 of preceding article.

pit by submersion, since these pumps have no suction pipe. Before starting a test the manometer tubes were pumped full of water to remove any trapped air. The gate valve was then set to produce the desired head.

During the test a man was stationed on the ladder in the pump pit to read water levels and take time with a stopwatch. Another man operated the discharge-gate valve, regulating this so as to keep the mercury head constant in the manometer as the water level in the pit was pumped down. The pump was started as soon as the manometer indicated a constant head, and the pit observer read the water level on the level-rod gage. He then followed down the ladder and gave the signal to stop when the lower level was reached; at this time he also read the gage and stopwatch. Peculiarities in the performance of a pump tested before its trash rack had been installed were traced to wood paving-blocks and other debris lodged in the pump vanes. Removal of these objects resulted in material increase in capacity.

For the horizontal screw pumps the test set-up is shown in Fig. 5 of the preceding article. Head was measured as previously described, except that, since each screw pump has a suction pipe, one side of the manometer was connected into that pipe. The head pumped against was varied by regulation of the gate valve in the discharge line. Since the suction water surface remained practically constant for any one test, the valve when once set required no adjustment during a test against any individual head. Heads were varied up to 28 ft.

The capacity of the pump was determined by measuring the suction necessary to accelerate the water into the throat of the pump just beyond the suction flange. An inverted water manometer was used, with one leg connected into the throat of the pump and the other leg connected by a tube to the suction bay. A coefficient of 0.97 was used in computing discharges. Power input was determined by voltmeter and ammeter readings, and the speed of motors was checked at intervals. From these test data the pump capacity, brake horse-power and efficiency were computed by usual methods.

Track Renewal by Rail-Length Units in Europe

Special machines place rails and ties in built-up sections on ballast bed compacted by power rollers

RENEWING TRACK in unit rail-length sections, each unit composed of rails and ties fastened together complete and ready for use, so that it requires simply to have the rail joints spliced to the adjacent track sections, is a feature of maintenance-of-way practice that has been introduced in Germany within the past few years, apparently with satisfactory results. This system was described at the recent meeting in Spain of the International Railway Congress, in a report by Mr. Muller, of the German State Railway Co. Special machines of large size and equipped with power hoists and other apparatus have had to be developed for this work, as a 33- to 66-ft. length of track with heavy rails and a number of ties is a heavy and cumbersome load to be handled. The same system has been tried in both Ireland and England, and a ponderous machine designed for this work was described in *Engineering News-Record* of Feb. 25, 1926, p. 334.

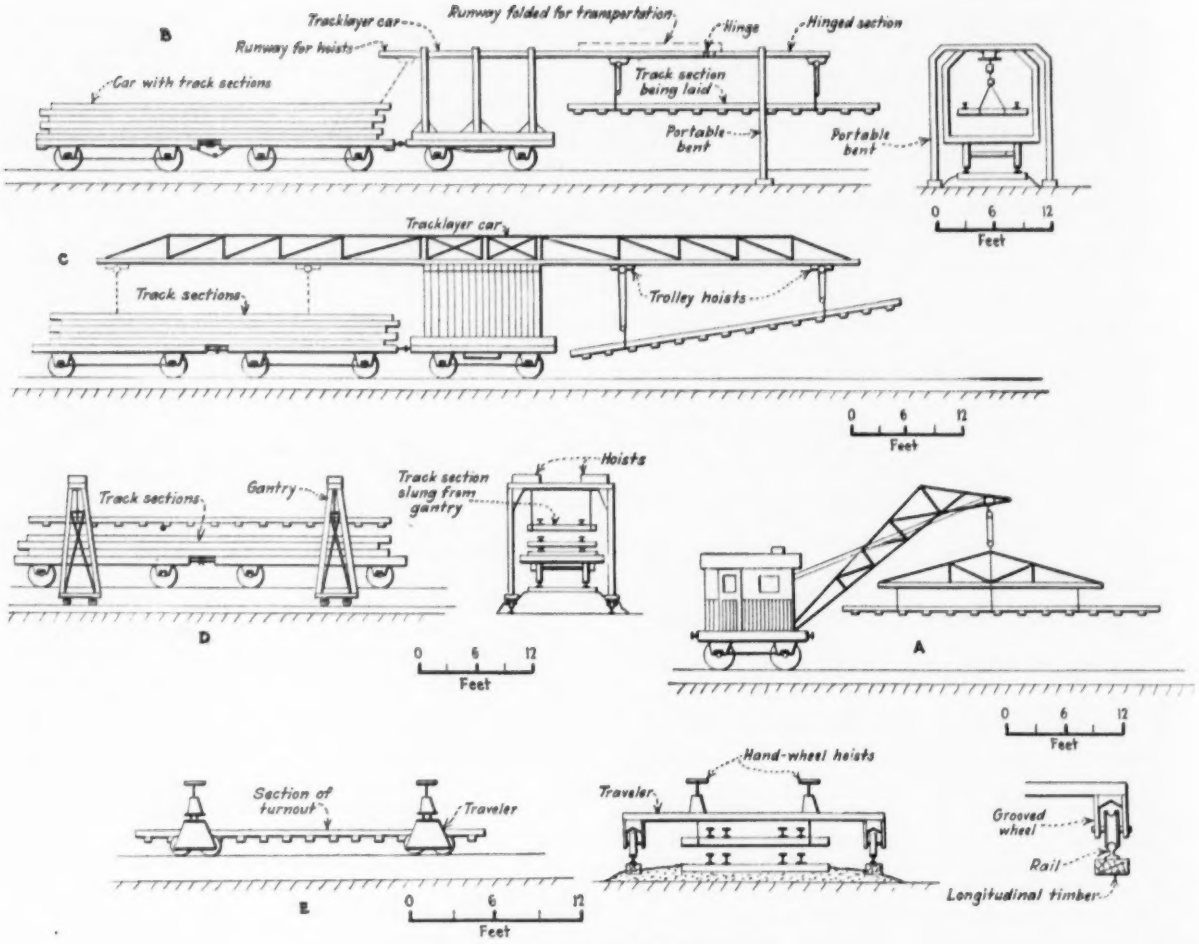
But while the system has been of a limited and experimental character in England it appears to have been employed in regular service and on a more extensive scale in Germany. On the earlier work a locomotive crane was used, having a gooseneck boom carrying a long stretcher frame to which several of the ties of each track section were attached by slings, so that the rails would not bend when the track section was suspended from the crane. With this machine, however, which is shown at *A* on the accompanying drawing, there was the disadvantage that it was necessary to occupy two tracks, the crane running on the track that was being renewed, while on the other track was a train of cars delivering the new track sections and receiving those released. To overcome this objection different types of machines have been devised for handling the work entirely on one track, a stretch of which is given up temporarily to the maintenance forces.

Hoch Machine—Here the tracklaying or track-handling machine is a steel framed, four-wheel flat car fitted with light steel bents carrying an overhead longitudinal runway, the rear end of which extends as a short cantilever over the end of the adjacent flat car. The other end extends over the track and is lengthened by a hinged or folding section supported by a steel A-frame or bent seated in the ballast, so that when at work the runway projects somewhat more than a rail length beyond the car. Two trolley hoists travel on the runway. This machine is shown at *B* on the drawing.

With a trolley hoist one end of a track section on the cars behind the tracklayer is picked up, and the track is pulled forward far enough for the second trolley to pick up the rear end. Then both the trolleys carry the unit out on the runway ahead of the car and lower it upon the prepared bed of ballast. When the heel joint is spliced to the track already laid, the train moves forward a rail length, and another track unit is placed in the same way.

In operation the procedure is to send out the machine with empty flat cars, picking up several lengths of old track behind the train and loading them successively on the flat cars. When these cars are loaded the train returns to the material yard. A train of cars loaded with new track sections is then sent out, having the tracklayer at the head end and the locomotive at the rear. These new track sections are then laid in succession, as described. The trolley hoists are driven by electric motors, current being supplied by a gasoline generator set mounted under the tracklayer car.

Niemag Machine—While this machine is of the same general type as the one just described, it is of heavier construction, is self-propelling and has an overhead runway truss projecting as a cantilever for a full rail length beyond each end of the car, so that it can be used in either direction. It is shown at *C* on the drawing. An oil engine furnishes power for the trolley hoists, for the propelling gear and for cables by which the sections of old track are hauled back onto the flat cars as the rear and corresponding sections of new track are pulled forward within reach of the trolley hoists. This machine can travel under its own power at speeds up to 5½ m.p.h., and on level track it can haul two cars loaded with track sections. Each car can carry five track sections having wood ties, or six sections having steel ties.



Machines for handling track sections

Neddermeyer System—Instead of using apparatus mounted on cars, this system employs two light steel traveling gantry frames, or three gantries for track sections with 66-ft. rails. They are shown at *D* on the drawing. These gantries, which span the track, are 9 ft. 3 in. high and 10 ft. 2 in. wide between the posts; they have grooved wheels traveling on rails laid temporarily outside the ballast slope. Each gantry is designed for a load of 2½ tons and has on its cross-girder two hoists operated by hand by means of endless chains. The gantries are erected in position with the aid of a gin-pole hoist mounted on a small motor car. Track sections are loaded on special low flat cars, which are hauled by a gasoline motor car.

Renewing Switches—For the renewal of switches and turnouts complete, or in not more than two or three sections, a system somewhat resembling the Neddermeyer system has been used, but with gantry frames only about 2 or 3 ft. high above the track rails, as shown at *E* in the drawing. The cross girder of the gantry is mounted on a two-wheel truck at each end, riding on temporary rails. On each gantry are two vertical screw hoists operated by horizontal hand-wheels, the track section being hung from these hoists.

Ballast Rolling and Tamping—It is to be noted that in all these cases the new track sections are laid directly upon a prepared bed of new stone ballast, so that little tamping is required to bring the track to surface. Additional ballast is placed later to fill the cribs or spaces between the ties. In work of this kind the practice is to renew the entire track structure above the subgrade, the old ballast being removed and the subgrade dressed to standard section. The new ballast is distributed either by side-dump cars or four-wheel steel hopper cars with side-discharge chutes and gates. A curious practice where track is laid with steel trough ties is the use of ballast boxes or molds in which cores of ballast are formed to fit the shape of the inverted trough tie. In this way, when the track section is lowered into place, each tie is given a full support with only a small amount of tamping. However, great care is necessary to insure the exact spacing of the ballast cores for a rail length.

Of special interest is the practice of compacting the ballast bed by rolling it in layers 4 to 6½ in. thick, giving usually a 20 per cent compression or reduction of volume. A two-wheel or three-wheel roller of 5 to 7 tons weight is used, with a 12-hp. gasoline or oil engine, and having a speed of 1½ to 3½ m.p.h. The width of roller is 3 ft. 7½ in. on a tandem machine or 5 ft. 9 in. over the side wheels of a three-wheel roller. The machine can be fitted with flanged wheels to ride on the rails after the new track is laid, the roller then compacting the top ballast in the cribs. A special box car is used for transporting the roller, one end of the car being hinged so as to drop and form a ramp on which the roller can be moved in and out of the car.

Cleveland Stadium Laid Out As Ideal Baseball Stand

Structure of unique shape seats 78,000—Provides efficiently for baseball, football, boxing and track meets—Composite pile foundation carries double-deck steel and concrete stands —Bleacher stand of reinforced concrete on spread footings

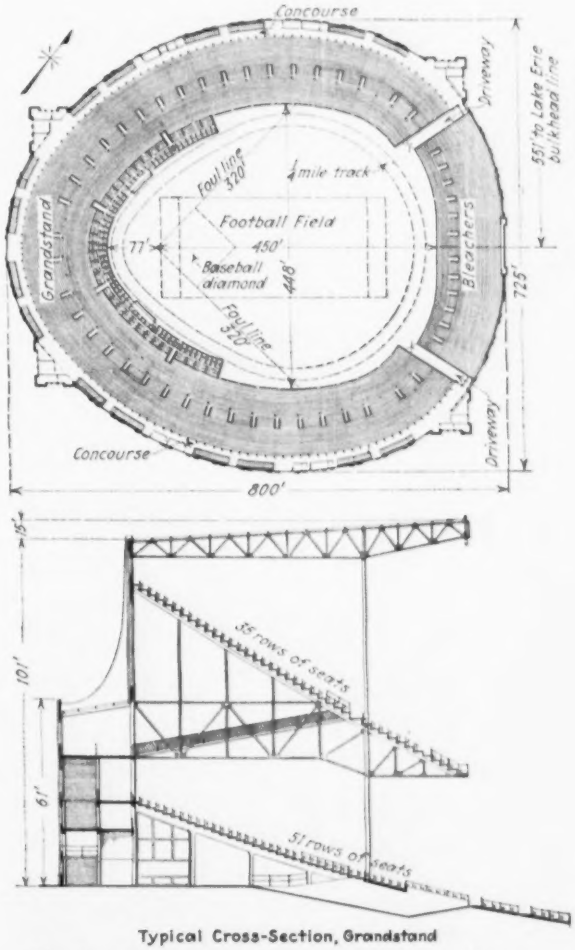
CLEVELAND'S new municipal stadium, opened July 2, involves several design and construction features that are of interest. The plan of the structure was evolved from a study of an ideal baseball stand. It provides a baseball diamond with foul lines 320 ft. long and a distance of 450 ft. between home plate and the bleachers, and at the same time keeps the central part of the stand close to the head of the field. An egg-shaped field, seating 78,000 and with an area of 4.2 acres, resulted. The arrangement, while ideal for baseball, is also efficient for football, track, boxing, pageants or other functions. For football the seating capacity is 90,000. The grandstand is a double-deck structure of steel frame and concrete slabs carried on clusters of composite wood-and-concrete piles. The field or bleacher stand is a single-deck structure of reinforced concrete supported on spread footings resting upon the fill ground.

The stadium is located adjacent to the east basin of Cleveland harbor and northwest of the public buildings known as the Group Plan. The building is almost directly north of the Court House and only about 200 ft. from the water's edge. Originally the site of the stadium was within Lake Erie, but it has been filled in behind a bulkhead for more than twenty years. Much of the filling material was composed of city rubbish and cinders, to a depth of about 20 ft. A thin layer of sand covers the old lake bottom; below this is plastic blue clay. The field grade elevation is approximately 15 ft. above the level of Lake Erie. The ground level around the outside of the stadium is 11 ft. higher than the playing field.

The extreme dimensions of the stadium are 800 ft. from east to west and about 720 ft. from north to south. In a typical cross-section the front rows of the main deck are concrete laid directly on the ground. The rear portion of the main deck is concrete supported on structural steel. The upper deck is also concrete supported on structural steel, as shown in one of the accompanying drawings, with a 29-ft. cantilever beyond the steel columns. In the roof the cantilever is 37 ft., being projected 8 ft. beyond the front of the upper deck so as to provide better protection against the weather. The top row of seats is 100 ft. and the floodlights on the roof 115 ft. above the playing field.

On the main deck are 51 rows of seats, of which eight rows are boxes equipped with loose chairs, while the others are grandstand chair seats anchored down. Twenty-five rows of the main deck are in front of the line of columns that support the upper deck and roof. On the upper deck ten rows of seats (four rows loose chairs and six of fixed chairs) are located in front of the columns, and 26 rows behind the columns. For football games temporary seats may be installed on each side of the playing field.

The two-deck grandstand is built around three sides of the playing field; the open end of the horseshoe is filled with a single-deck concrete bleacher structure of 52 rows. Space is allowed for a driveway between each end of the bleacher and the grandstand structure. Plank seats are provided for the bleachers.



Typical Cross-Section, Grandstand

Egg-shaped plan of new Cleveland municipal stadium provides sight lines and playing area ideal for baseball and compares favorably with other stadiums for other sports

Construction Features—Located on the shore of Lake Erie, the relatively heavy grandstand structure required pile foundations. More than 2,500 composite piles, aggregating 164,000 lin.ft., were used. They consist of wood piles extending below groundwater level (approximately lake level) and a concrete section above. The top of each timber pile was formed in the shape of a dowel with

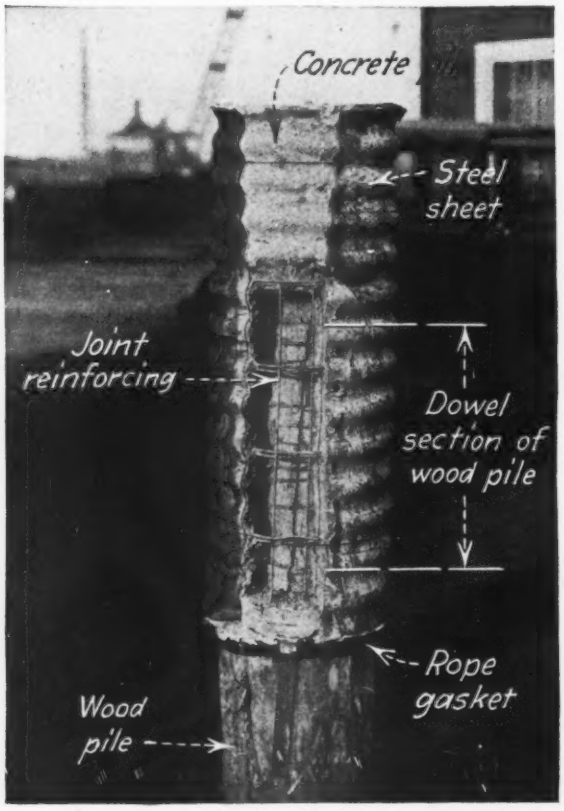
the concrete shell cast around it, reinforced above and below the end of the wood pile. The concrete section of the pile was cast inside of a corrugated-steel shell; in order to prevent the concrete from running out of the steel shell at the bottom, a gasket of large hemp rope was wrapped around the wood pile below the corrugated-steel shell.

Steelwork for the superstructure was received at a railroad siding at the site and erected with steel stiff-leg derricks with 130-ft. booms.

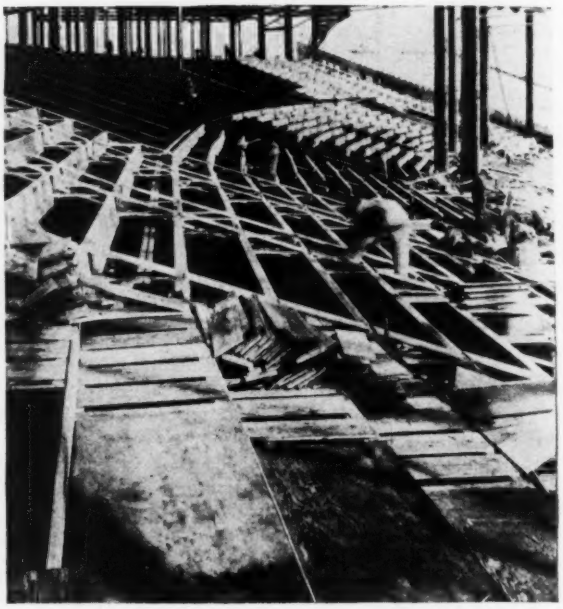
To assure concrete surfaces of smooth and pleasing appearance on the under side of the deck and on the column faces, all wood forms were lined with plywood. In addition to producing concrete of good appearance, the plywood permitted skeletonizing the main forms, with a consequent saving in form lumber and labor. About 15,000 cu.yd. of reinforced concrete and 500 tons of reinforcing steel were required to pour the columns and the 123,000 sq.ft. of deck surface.

The architectural appearance of the exterior walls was designed to harmonize with the general color tone of the buildings in the Group Plan. In order to minimize the apparent height of the building, a gray brick was used in the lower three-fifths of the outside wall. The upper two-fifths of the wall is offset from the lower portion and covered with gray-plate aluminum sheeting. Large arch-shaped windows were introduced in the brick wall to produce a colonnade effect. The aluminum sheeting is largely made in the form of louvers for ventilation. More than 130,000 lb. of aluminum was used in the building.

Among the unusual features of the Cleveland stadium are the floodlights mounted on the roof (250 to 1,000 watts each), which give a light intensity varying from 18 to 50 foot-candles on the field; the illuminated changeable numbers on the scoreboard; and a public address system mounted on the scoreboard and moveable about the field for pageants.



Composite wood-concrete piles were used because of the lake-shore site of the stadium



Forms for stadium deck are lined with plywood to insure smooth finished concrete surfaces

The stadium was designed and built under the general supervision of the Osborn Engineering Co., Cleveland. The firm of Walker & Weeks, of Cleveland, was the consulting architect. The construction work was handled by the division of engineering and construction of the city's department of public service. The work was divided into separate contracts in order to hasten the construction work while the plans were being prepared. The pile foundation was built by the Frederick Snare Corp., of New York. The structural-steel frame was furnished by The American Bridge Co. and erected by the Bass Construction Co. The electrical work was installed by the Parker Electric Co., and the seating by the Theodore Kundtz Co., both of Cleveland, Ohio. The concrete work and general construction work was executed by the W. J. Schirmer Co., of Cleveland, Ohio. Daniel E. Morgan is city manager, Rees H. Davis is director of public service, Robert Hoffmann is consulting engineer, and George B. Sowers is commissioner of engineering and construction of the city of Cleveland.

Treatment of Wood Declined in 1930

An 8 per cent decrease in the quantity of wood given preservative treatment during 1930, as compared with 1929, is reported in the annual compilation of statistics on the wood-preservation industry prepared by the Forest Service of the U. S. Department of Agriculture in co-operation with the American Wood Preservers' Association. Plants in active operation numbered 204, of which 53 were of the non-pressure (open-tank) type and 134 of the pressure-cylinder type. The actual quantity of wood treated was 332,318,577 cu.ft., all but 10 per cent by the pressure process.

Cement Pressure-Grouting Stops Settlement of Ramp Piers in Fill

By M. TAYLOR
Dravo Contracting Co., Pittsburgh

ON COMPLETION of a ramp at the Charleston, W. Va., station of the Chesapeake & Ohio Railroad, settlement of the foundations prevented the new structure from being opened to traffic. The ramp is a reinforced-concrete structure supported on nine pairs of piers, 50 ft. center to center, with an abutment 54 ft. long at the lower end. By connecting interstate highway No. 60 with the bridge crossing the Kanawha River into Charleston, the structure eliminates a grade crossing.

The footings of each pier, 9 ft. square, extend to 10 ft. below station platform level and were designed to take a load of 4,000 lb. per sq.ft. These stand on filled-in material that extends to an average level of 20 ft. below platform level. Beneath the fill are alternate layers of sand, silt, gravel and clay, with bedrock at depths varying from 40 to 50 ft.

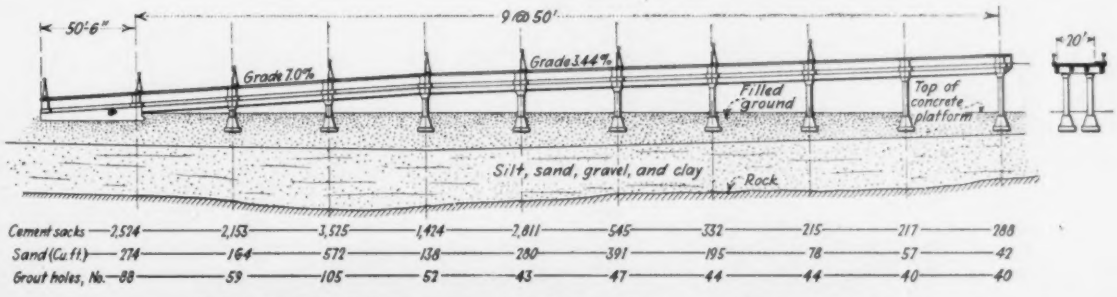
Because of the difficulty and cost of placing piling down to rock with the structure in place, other methods of arresting the settlement were sought; finally it was decided to consolidate the foundation strata down to bedrock by forcing in cement grout, using the method known as the Francois cementation process. To introduce the grout into the ground, hollow sectional drill-rods were forced down to rock by compressed-air hammer drills. The drill bit, 1¾ in. in diameter, was provided with several small openings along its length, and during the drilling a small amount of water was passed down the rods to keep the holes clear. With the drill bit at full depth the injection of cement grout was commenced, using Francois ram-type grout pumps for the purpose. The grout, pumped down the rods, passed out into the ground through the openings in the bit; and as the resistance to injection increased by the filling of the voids at that depth, the rods were slowly raised to allow the ground around the hole to be impregnated the full depth.

Commencing from the abutment end, early work showed that there was an exceptionally large percentage of voids, particularly around 20 ft. below surface; groundwater evidently had carried a large amount of the finer material into a near-by culvert. As this made it impossible to prevent the grout from spreading beyond the footing that was being injected, a series of vertical holes at 6-ft. centers was bored around each pair of piers from 5 to 6 ft. outside the edge of the footings. Into these holes sand, mixed with a small amount of cement grout, was forced. This procedure blocked up the washed-out channels and helped to prevent the grout subsequently injected from spreading away from the footings. For the injection of neat cement the drill-rods were forced down at a slight inclination from the vertical, in order that the grout should be introduced into the ground immediately under the footings. Each grout hole was injected up to a pressure of 200 lb. per sq.in., with grout varying from one part cement to three parts water, up to equal proportions, according to the nature of the ground encountered. Enough grout holes were put down to obtain a uniform consolidation, as shown by the hardness and resistance to drilling of further holes.

Driving down injection rod with pneumatic drill

Beyond the fourth bent from the abutment less subsidence had taken place, the scour of fine material by water was not in evidence, and consequently, with a normal percentage of voids, the amount of cement necessary to effect consolidation was much reduced, as shown in the accompanying illustration.

Under the abutment and the nine pairs of piers the total cement used for grouting amounted to 3,508½ bbl., together with 81 cu.yd. of sand. A total of 562 grout holes was necessary, the work taking four months to complete. On completion of the grouting the ramp was subjected to a loading test over its full length at once. On each 50-ft. section 130 tons of sand was placed, which increased the load on the footings by 1,600 lb. per sq.ft.


50'-6"
9 @ 50'
20'
Grade 7.0%
Grade 3.44%
Filled ground
Top of concrete platform
Silt, sand, gravel, and clay
Rock
Cement sacks 2,524 2,153 3,525 1,414 2,811 545 332 215 217 288
Sand (Cu.ft.) 274 164 572 138 280 391 195 78 57 42
Grout holes, No. 88 59 105 52 43 47 44 44 40 40

Sketch of C.&O. Railroad ramp at Charleston, W. Va., showing number of grout holes and amount of sand and cement placed under each two-pier bent

The duration of this test was seven days, and no movement was measured during the period.

After jacking up the ramp and rebuilding the concrete pillar caps to offset the settlement, the ramp was opened to traffic. The repairs were completed at a considerable saving over the estimate for supporting the structure on piles.

The work was done under the direction of C. W. Johns, chief engineer of the C. & O. Railroad, Richmond, Va. The grouting was carried out by the Dravo Contracting Co., of Pittsburgh.

Through-Cantilever Bridge of Concrete Built in Scotland

A CANTILEVER bridge of unique type has recently been built in Scotland to replace a 100-year-old suspension bridge that had become inadequate for modern traffic. The new bridge is of the through cantilever type and utilizes reinforced concrete throughout. It has a main span of 216 ft., anchor spans of 150 ft., a 20-ft. roadway and two 8-ft. sidewalks. The bridge crosses the River South Esk and was built jointly by the County of Angus and the Royal Burgh of Montrose.

The approaches and abutments of the old suspension bridge were utilized in the new structure, and two new piers were built in the river for additional support between the existing abutments. For these piers four steel cylinders 22½ ft. in diameter were sunk in the bed of the river, the material being excavated with buckets under water and the cylinders forced down by heavy weights, aided by water jets directed under the cutting edges by divers. At the estimated bottom it was found that the foundation material was not so good as was expected, and concrete piles, 14x14 in. and 60 ft. long (32 in each cylinder), were driven, the points of the piles resting on solid rock. The height from the bottoms of the piles to the tops of the towers over the piers is about 150 ft.

The curved top chords of the cantilevers are each subjected to tensile forces of 1,000 tons and are reinforced with 76 1½-in. steel bars. At the abutments the bridge is supported on a triangular concrete shoe, the bottom angle of which is flattened to slide on a plate on the upper surface of the abutment. The bridge is tied to the abutments by rods free to slide in tubes filled with a mixture of pitch and wax. Since it is possible that movement at the abutments may later be restricted by dirt and rust, the main piers are made sufficiently slender to bend under side thrust. In addition, the upper surfaces of these piers are made in the form of half rollers fitted into cups at the base of the vertical posts of the cantilever. Bearing plates are phosphor-bronze sheets embedded in the concrete. Connecting the two cantilever arms at the center of the main span is a suspended span 21 ft. 7¼ in. long, supported on pin joints, one of which is designed to slide. Expansion joints are also placed across the bridge floor at each end and at the center. The floor beams vary in section both vertically and horizontally in accordance with stresses to be carried. The bridge was erected on wood centering.

The engineer and designer of the bridge is Sir E. Owen Williams, of Westminster, and the resident engineers were H. Iorys Hughes and A. H. Clark. Sir Robert McAlpine & Sons were the contractors. The bridge cost about $435,000; the ministry of transport paid 65 per cent of this and the remainder was divided equally between the county and the burgh.

Fig. 2—A 20-ft. roadway and two 8-ft. sidewalks are carried by the concrete cantilever trusses of the new Montrose Bridge

Fig. 1—Concrete cantilever bridge at Montrose, Scotland

Less-Used and Experimental Bank Revetment Structures

Fig. 1—Lumber mattress revetment under construction
View shows full crew for 86-ft. mattress constructed in 1930 at Rushville Bend, Missouri River.

Brush mattress loses strength and flexibility in a few years—Lumber mattress and Pittman, Jacoby and Parker revetment described—Essentials of successful revetment mattress

By F. Y. PARKER
Assistant Engineer, U. S. Engineer Office, Kansas City, Mo.

MODERN subaqueous bank protection until recently has been almost entirely confined to some type of willow mattress, such as fascine *ENR*, July 3, 1930, p. 4); framed (*ENR*, May 1, 1930, p. 720); basket-weave (*ENR*, March 5 1931, p. 395). To this list of willow mattress types should be added the pole mattress of the middle Mississippi. This mattress duplicates the basket-weave header and is then similar in construction to the lumber mattress—hereafter described—poles, 3 to 6 in. butts being used instead of boards.

Since about four years is required for basket-weave willow growth and twice that time for pole-weave growth (the average crop rarely exceeding 16 to 18 cords per acre), mattress demands and the clearing of riparian lands have reduced the available supply in most localities to the vanishing point. A substitute mattress has been devised from lumber, but it is not a new type, as it has been used off and on for a number of years. The increasing scarcity of weaving willows has brought it into prominence in the past two or three years, especially on the Missouri River. Possibly for the same reason the articulated concrete mattress has forged ahead on the lower Mississippi.

Life of Brush Mattress

While willow mattresses (fascine, framed, basket-weave and pole) are the best yet devised, view from every angle, for subaqueous bank protection, there are unavoidable weaknesses, the most serious being softening of the weaving brush with consequent loss of strength. Examinations of Mississippi River mattresses have shown that although they may be perpetually submerged, the brush of which they are constructed deteriorates and loses strength, but at a slower rate than when exposed to the air. The rate of decay depends on the size and kind of brush—cottonwood decaying much quicker than willow. Brush submerged six years was little changed; after nine years submergence it was minus bark, twigs and small limbs, with sapwood spongy. The nine-year condition remained practically stationary up to twenty years, with the strength concentrated in the heart. These observations on the Mississippi have been verified on the Missouri by the writer. They appear to indicate that mattresses woven of small brush are effective, after nine or ten years, only if undisturbed. If these mattresses are disturbed by undermining or other causes, they will not adapt themselves to the changed conditions without rupture. Solely because of larger hearts, mattresses constructed of large brush (pole mattresses) are in better condition after a score of years than those made of small brush.

Lumber Mattress

The disadvantages of willow mattresses are found in the lumber type, with the added unavoidable defects of stiffness, permeability and structural weakness.

The construction of a lumber mattress (Fig. 1) is, briefly, as follows: All lumber (boards) used in the work is 1 in. thick, 4 in. wide and not less than 12 ft. long.

On top of the half-header, weavers—selected boards—are laid 4 ft. apart and their ends nailed and lashed to the half-header. As a rule weavers are lap spliced, not less than 3 ft., throughout the length of the mattress, the laps being nailed and bound with strand.

The top half-header is constructed similar to and directly over the bottom half and the whole is lashed with one turn of strand every 3 ft. and spiked so as to form a strong clamp. A second clamp, similar to the header, is usually constructed, 5 or 10 ft. therefrom, for anchorage or head lines.

Lumber is now woven 4 in. apart, each board being

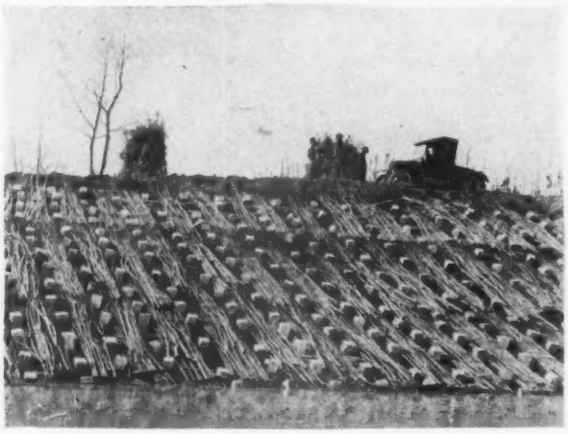


Fig. 2—Jacoby experimental mattress revetment

Constructed 1925 at Blue Mills Bend, Missouri River. Concrete blocks 7x7x14 in. spaced 30 in. apart and threaded on ⅝-in. cables through holes 4 in. from ends.

normal to and over and under the weavers. Weaving progresses simultaneously from both mattress edges toward the center with the 18-in. lap splices nailed and lashed with strand. Continuous lines of splices are avoided. The board ends are shifted to break joints and the weaving boards are passed under and over those weavers that the preceding course passed over and under, respectively.

The inner and outer edges of the mattress are strengthened underneath the end weavers by a continuous dropboard, which is nailed and bound with strand to the mattress.

Top boards are laid over the woven mattress directly over the weavers, breaking joints with them and with adjacent top boards; the 3-ft. lap splices are nailed and lashed with strand.

Cross-binders, of three thicknesses of boards, are placed 20 ft. apart across the entire mattress. These binders are lap spliced to the weavers, stapled with 4-in. staples and bound with strand.

The outer mattress edge is usually cribbed by laying additional boards over the top boards and cross-binders, to which they are spiked and lashed; cribs 4 to 8 ft. square and 8 in. deep are formed which assist in holding the ballast.

Finally, from ten to twenty, depending on the current and depth, ⅜-in. strands, continuous throughout the mattress, are fastened to the header and weavers, each strand being twined around its weaver and top board and drawn tight with block and tackle.

Experimental Revetment

Experimental mattresses have been tried at various times in the hope of producing a type cheaper and better than those now constructed—a type that would eliminate some of the recognized defects of those now in use. Three experimental types are described.

Jacoby Mattress—The Jacoby mattress (Fig. 2), invented and patented by a Kansas City, Mo., civil engineer, consisted of small bundles of brush laid at right angles, secured to ballast by cables. The structure was held together by ⅜-in. galvanized cables passing over and under the bundles and through holes cast in concrete blocks. The 7x7x14-in. blocks were cast from river gravel at the site of the work. As fast as the mattress was completed it was slid from the fingers and automatically sank to the riverbed. About 200 lin.ft. of 86-ft. subaqueous mattress was constructed in 1925 at Blue Mills Bend (Mile 370) Missouri River. It will be observed (Fig. 2) that the mattress was extended to the top bank. This was done with the expectation that a bankful stage would soon prevail and fill the mattress with silt. In about a year after construction the subaqueous mattress began to fail and soon thereafter was practically destroyed, but the bank mattress functioned for several years, being finally destroyed by a brush fire.

Failure of the subaqueous mattress was probably due to thickness and insufficiency of ballast, since the work was exposed to swift, changing currents at all times.

Pittman Mattress—U. S. Assistant—now Area Engineer—Pittman devised this mattress, of which 200 ft.

Fig. 3—Pittman bedspring-type mattress revetment

was constructed in Blue Mills Bend. The essential part, or foundation, was parallelograms (10x20 ft.) constructed like bedsprings (immense bedsprings, in fact, Fig. 5) filled with brush and wired together (Fig. 3). After wiring, the mattress was stiffened by cross-poles and cables. Ballasting was accomplished in the usual manner and the top bank paved with stone.

This mattress failed in a comparatively short time; being exposed to eddies and cross-currents it is surmised that excess thickness was its principal defect.

Parker Mattress—This brush-wire mattress was designed by the writer and, as in the preceding types, 200 ft. was constructed in Blue Mills Bend in 1925.

The base of the mattress was No. 9 galvanized 6-in. wire mesh, into which the butts of small brush were inserted (Figs. 6 and 7), no weaving was done. Poles and cables were used to stiffen the structure against buckling, and ballasting was done by loading with stone. The graded bank was covered with a thick layer of spalls and the wire mesh extended thereover as a cover. This mattress is still in good condition. The following year a modified form, 2,000 ft. in length, was constructed about 65 miles farther downstream. Except for some repairs this mattress still functions

The writer believes that the apparent success of the wire-brush mattress can be attributed to thinness—there was practically no current obstruction.

Brush-wire mattress, curtain type (*ENR*, March 5, 1931, p. 395) is dissimilar to that described; the wire base is the same, but a basket-weave mattress is woven over the wire base and cabled thereto and ballasting is done by placing stone in a continuous pocket at the outer edge of the mattress.

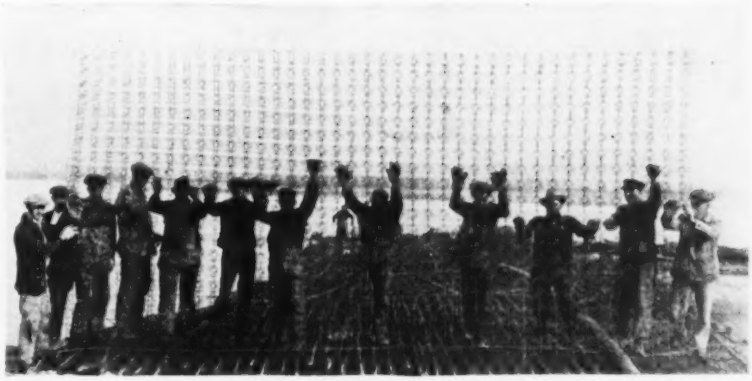


Fig. 5—Bedspring element of Pittman revetment

Conclusions

A perfect subaqueous mattress should embody, among other features, the following essentials: long life, cheapness, full protection against bank erosion, flexibility and thinness.

No comment seems necessary regarding the desirability of the first and second requisites. By full protection is meant complete prevention of current contact with the riverbed covered by the mattress, in order to insure against mud and sand being removed and thereby forming bottom irregularities. If this prevention is assured, all irregularities under the mattress, when laid down, will soon be filled by sediment in suspension.

Flexibility has long been recognized as important; if a mattress adjusts itself to the bottom—lies flat on the bottom—there is no point, more than another, inviting current attack.

It has not generally been conceded that thin mattresses are desirable and that "the thinner the better" should be the slogan, other considerations being equal. Water flowing over irregularities invariably creates eddies and cross-currents with resultant scour. To illustrate: Extensive repairs to Bee Creek Bend revetment near Leavenworth, Kan., becoming necessary in 1930 and, no mattress brush being available, recourse was had to timber cleared from the adjacent bank. Logs of various lengths and sizes were made into rafts, covered with brush, overlaid with wire mesh and sunk as a mattress substitute. A low-river stage exposed the work, and it was found that invariably scour had resulted at and under the makeshift mattress.

The antithesis follows. Many years ago the writer was connected with a survey of the Yazoo River. This river at low stages, before emptying into the Mississippi, flowed, swift but shoal, over ¾ mile of sandbar. Small river steamers were unable to make much headway over the bar upstream on account of shoalness and swiftness, and the skippers were forced to plant deadmen on the bar with lines to their capstans in order to retain the small gains that were made. However, when an obstruction was placed in the stream, the depth around it would increase several feet in a short time.

The writer believes that some type of curtain mattress will be the solution of riverbank protection. The ultimate answer seems to be a type of mattress that will automatically function, thus avoiding subaqueous mattresses with their unavoidable weaknesses and riprap that settles or sloughs from seepage and storm-water—all possibilities that demand constant watchfulness and immediate attention when weakness appears.

Fig. 4—Parker straight brush and wire mesh mattress revetment

Brick and Mortar Volume Found to Be Affected by Moisture

Water content has a distinct relation to the volume of many building materials, the expansion and contraction attending wetting and drying often being greater in magnitude than similar changes produced by normal temperature changes from season to season. A study of this effect and of the means of insuring against the transmission of water through brick walls has been conducted at the U. S. Bureau of Standards by the American Face Brick Association. Results are reported in the June number of the Bureau of Standards *Journal of Research*. It has been determined that when the outer surface of a wall built of brick and mortar with different rates of expansion becomes wet, the mortar tends to become separated from the brick. Results of the study indicate that volume changes in mortars usually exceed those in well-burned clay or shale brick, but that careful choice of materials permit brick and mortar to be selected that will be well adapted to one another from this standpoint. For quality brickwork a low rate of expansion with moisture change is as essential as compression strength or any other desirable property, according to the conclusions in the report.

Variations Do Not Condemn Cement Test Proposed by Merriman

STUDIES made in the Bureau of Standards of the Merriman method of predicting the resistance of cement to disintegration were published in the July 23 issue of *Engineering News-Record*, p. 130. The studies were made by E. T. Carlson and P. H. Bates for the purpose of supplying the basic laboratory data for checking the Merriman method in service tests of cement now going into government projects. The laboratory results were sufficiently lacking in uniformity to raise a question of the accuracy of the proposed method. Because of the wide interest of this conclusion a number of men who are close students of cement problems were asked by this journal to comment upon the results of the Carlson and Bates tests. Two of the comments are given herewith. —EDITOR.

Better Methods of Testing Cement Needed

By NATHAN C. JOHNSON
Consulting Engineer, New York City

SOME METHOD other than those that we have long had for determining the value of cements, or the value of one cement versus another, is of vital and far-reaching importance to the construction industry.

The main function of cement in construction is to stick other things together and to keep them sticking as originally stuck. The object of a test for cement should be to determine the ability of any cement to fulfill these functions. This is a very large order, for in commerce the "other things" used with cement are so varied in character and nature, in deference to Sir Dredge and Sir Crusher, and often so unsuited to any use with cement whatsoever, that the marvel is more that cement does any job at all under such circumstances rather than that there are some legitimate kicks about the behavior of cements or doubts as to their relative values.

However, since the interaction of manufactured cement plus water is the footstone of the whole matter, any test that will well and truly and without fail reveal the value of cements before purchase not only should be thoroughly investigated but also should be developed to the full, providing it gives initial promise of being of value. But when developed fully, this test for value in cement should be as accurate and as impersonal as is an ammeter, a voltmeter or a wattmeter.

The need for a new test is evident from the unfortunate fact that our present "standard tests" do not to any provable degree provide such a measure. They cannot do so, if followed, for although "water" is the reacting fluid for cement, standard test specimens do not even require the use of distilled water—the only standard water there is, the world around—in the making of laboratory tests. Water as it comes from taps contains many substances which affect some cements adversely and some advantageously. Distilled water alone is free from this variance.

Although present "standard tests" are thus inaccurate in this very nature, these tests have, it would seem, come to be used as pawns in the game as it has come to be played; and any effort at getting at a better test is regularly opposed and flattened out by a well-oiled machine that knows what it wants and how to get it.

Mr. Merriman believes he has such a better test. Carlson and Bates confirm a trend similar to Merriman's findings but also report variable results.

Personal errors can occur anywhere and as easily at one laboratory as at another. The errors reported by Carlson and Bates with the Merriman test are not so great as the errors commonly reported under the so-called "standard tests" by any two laboratories using the same materials, but since discrepancies are reported, the Merriman test evidently needs simplication and refinement to make it, as said above, as impersonal as an ammeter. Obviously also, the "standard tests" do not fulfill this requirement; and they, too, need simplification and refinement, and quite possibly entire realignment.

With the same end in view as Merriman, some work has been done by the writer along different lines, whereby both the acceptability of cements, as well as their retrogression, if any, is quickly determined. This method seems to the writer to be amply sufficient for determining acceptabilities without recourse to the "standard test methods." It also is impersonal and thus far the commercial results seem to vouch for its value and general accuracy.

This comment, however, is no place for an exposition of this test beyond this mention; and this mention is made only because, whether Merriman is right or is wrong, it is well to know that test methods other than the "standard test methods" not only are possible but are quite probably developing toward a full perfection.

Let us hope for a speedy coming of the day of realization.

* * *

Merriman Test Method Is Not Without Merit

By JOHN R. BAYLIS
Physical Chemist, Bureau of Engineering, City of Chicago

I HAVE READ with interest the article "Can Cement Durability Be Predicted?" by Carlson and Bates, in the July 23, 1931, issue of *Engineering News-Record*. The authors show better results with the Merriman sugar method of predicting the durability of concrete than I expected would have been the case when it was first proposed. It is true that there is a scattering of the points when plotted that tends to throw some doubt on the method as a specific index of the durability of concrete manufactured from the cement, yet there is sufficient relation to show that the method is not without merit.

If it were a question of using this method, in preference to some other method already in use, there might be reasons for rejecting it, but when we have no method it would be well to give the Merriman method more study. An editorial in the July 23 issue states that the Washington laboratory challenges the utility of the method.

I do not entirely agree with this conception. It seems to show very conclusively that the method has some merit. I am of the opinion that it will show more uniform results than strength tests.

It would be useful if someone could work out a simple test that would indicate accurately the power of the concrete to resist weathering agents; but while we are waiting for such a method, why not try to use the one proposed? Field tests may show it to be a very good criterion of the durability of concrete under exposed conditions, or they may show the test to be no good. I am not convinced that exposure to sodium sulphate is a fair test of the durability of concrete.

Perhaps modification of the Merriman method would give more accurate results. The freezing and thawing test might be better than sodium sulphate, or the use of some salt other than sodium sulphate might give results that more accurately predict the durability of concrete made from the cement. The use of some compound other than sugar, or the mixture of certain salts with the sugar solution might give more accurate results. Certainly there are many modifications that should be made before abandoning some such simple method of testing the durability of cement.

What are the changes in the cement compounds that cause the concrete to weaken? What causes these changes? How may these changes be resisted either by changes in the manufacture of the cement or the manufacture of the concrete? Until there is more research along these lines progress is going to be slow. Just why this phase of the problem has been almost ignored in the vast amount of research work that has been done on cement and concrete is a matter that is difficult to understand.

An Early Yuba River Flood

By W. W. WAGGONER
Hydraulic and Mining Engineer, Nevada City, Calif.

THE PROMINENCE of flood-control problems and silt deposition on major streams recalls the classic 1861 flood on the Yuba and adjacent streams in California, which produced unprecedented debris deposits at the mouths of the mountain streams and in the lower navigable waters. This record flood transformed the central valley of the state into a temporary lake and deposited great cones of debris in the river valleys years before hydraulic mining had reached a major activity. Exact data are not available, but the historic records pieced together bring out interesting features and lead to conclusions which may prove valuable.

The Yuba River has a mountain watershed of about 1,200 square miles, embracing a region of the heaviest precipitation in the Sierra Nevada. The average annual precipitation is about 40 in. in the foothills, 50 in. at the higher elevations where the gold-mining activities centered, and about 75 in. at the elevation of maximum precipitation, 4,000 to 6,000 ft.

Beginning in 1861, a cycle of wet seasons set in, the flood of the first season producing the extreme flood in the history of the state. During December, 1861, and the following January, about 75 in. of rain fell on the lower Yuba drainage area, and during the same period about 42 in. of rain and 50 ft. of snow fell at the summit of the Sierra. The total precipitation for the season in the mining territory reached 109 in.; rains of 5 to 6 in. per day were not uncommon. The result of this unprecedented rainfall is not available in the form of discharge records or rivers stages, of course, but contemporary reports indicate the extent of the flood in a qualitative measure. From the foothills of Mount Shasta south to the base of Tejon Pass, the great central valley of California was a vast lake, not unlike the shape and size of Lake Michigan. The water entered the valley at a greater rate than it could be discharged through the Golden Gate. The tides ceased to act, and a thick, muddy flood flowed out through the Golden Gate, which discolored the ocean for a distance of 40 miles from land.

The Yuba River contributed its quota of this flood from its various branches; its waters were charged with mud and sand from the drainage area. On the lower Yuba was a narrow valley of extreme fertility, 1 to 3 miles wide, carved in the peneplain of the Great Valley. According to the records in 1858, 100 acres in this small valley produced 80 bushels of wheat per acre. The debris buried these farm lands and orchards to a depth of 9 ft. With the succeeding years of floods came further deposits, increasing in depth until the material raised the land upon the general valley plain. Levees were constructed to confine the deposits.

Extensive hydraulic mining developed rapidly after 1870 with the introduction of the hydraulic giant and stopped suddenly with the injunction in 1884 to restrain the discharge of debris into the rivers. The combined deposits of the early natural floods and later hydraulic mining were investigated in 1894 by the army engineers by a series of borings to determine the depth of deposit. These records, supplemented by other later surveys, indicate that the combined deposit produced by the floods and the hydraulic mining was about 20 ft. deep at the mouth of the mountain rivers, 35 ft. deep at the edge of the foothills, and 80 ft. deep 5 miles farther up the river. Examination of the material dredged from the river farther downstream near Sacramento reveals that the silt consists mainly of minerals taken from a fertile soil and is entirely different from the quartz sand found in the gravel mines.

Valuable lessons may be drawn from the result of the unprecedented flood, particularly with reference to flood control of debris deposition. The solution of the general problem, in the writer's opinion, lies in the construction of reservoirs in sufficient number and size to provide control of flows which cannot readily be handled by downstream channels. In addition, these reservoirs will provide for debris deposition to an extent that will remove the silt which otherwise would be dropped in the lower navigable sections of the river. They also will be valuable aids to irrigation. This general plan should be the basis of river control on any stream which is large enough to constitute a flood menace.

Regarding California streams, it is important to note that there has been no major flood since 1909, and that repetition of a cycle of wet seasons like that of the 60's would result in incalculable damage in the present valley area. Gaging records of the past two decades are not a valuable indication of the floods that should be anticipated.

ENGINEERING LITERATURE

A Monthly Review of Books and a Listing of New Publications

Contributions to City Planning Science

BUILDING HEIGHT, BULK AND FORM: How Zoning Can Be Used as a Protection Against Uneconomical Types of Buildings on High-Cost Land—By George B. Ford, A.I.A., Late General Director, Regional Plan Association, New York; formerly Consultant to the Commission on Building Districts and Restrictions of New York and to More Than 100 Other Zoning Commissions and Building Code Committees; Assisted by A. B. Randall, Building Economist and Engineer, and Leonard Cox, Consultant to the New York Tenement-House Law-Revision Commission. Vol. II, Harvard City Planning Studies. Cambridge, Mass.: Harvard University Press. Cloth; 7x10 in.; pp. 188; halftones and many line cuts. $3.50.

NEIGHBORHOODS OF SMALL HOMES: Economic Density of Low-Cost Housing in America and England—By Robert Whitten and Thomas Adams. Vol. III, Harvard City Planning Studies. Cloth; 7x10 in.; pp. 205; halftones and line cuts. $3.50.

IN STRIKING CONTRAST to most of the books on city planning are the "Harvard City Planning Studies," a series of monographs by one or more specialists. Earlier books in this field are generally compilations, tempered more or less by the experience and opinion of their authors. The Harvard series, while drawing freely from the best writings, are distinguished by containing the results of first-hand inquiries made to obtain current practice and opinion. From data thus obtained, combined with material already in print, deductions are made and discussed. There is no pretence of finality of conclusions for, as in all good research, the need for more data is sometimes shown. "Airports," the first of these studies, was favorably noticed in *Engineering News-Record*, Feb. 26, 1931, p. 269. Two additional volumes maintain the high standard set by the first.

Fortunately, George B. Ford had completed the first draft of his "report" on "Building Height, Bulk and Form" before his death a year ago. Most of the material in the volume is in the form of appendixes of data on the main subdivisions of the report. The latter is a masterly essay of 35 pages dealing with conditions and needs, physical factors and optimum building mass, and closing with a few "tentative recommendations," which are compared with actual zoning regulations in various cities. The author's grasp of the subject, his broad and open mind and freshness of viewpoint are remarkable. He gives particular consideration to tall buildings in relation to sunlight and skylight, traffic congestion, safety, dust, gases and noises, wind, air and outlook. The chapter on "Methods of Determining Optimum Building Mass" is based largely on data from owners and managers of buildings. Distribution of building bulk, the relation of rentals to exposure and the need for more space opposite lower windows, for larger courts and for lighter courts and yards are considered. The appendixes abound with graphs, including many outlines of apartment house forms or "envelopes" to accord with setback, court and height regulations. As a whole, this monograph is a valuable contribution to problems of tall buildings, from the viewpoint of designers, investors, owners and managers, as well as to their occupants and the city.

"Neighborhoods of Small Homes" takes up various phases of "the housing of the working classes" in America and in England. Of the two authors, Mr. Whitten has had long and varied city-planning experience here, and Mr. Adams in England, Canada and the United States, notably as director of the studies on the Regional Plan of New York and Environs. Both authors address themselves to the subtitle of the book, "Economic Density of Low-Cost Housing." Mr. Whitten considers the present American demand for small houses and low-rent apartments, current building problems, acreage costs, lot sizes, improvement costs, subdivision practice, requirements for light and open space, and the general problem of planning as affected by improvement costs and community values. He concludes with a series of recommendations. Mr. Adams gives a summary of housing legislation and conditions in England, discusses types of houses in relation to housing costs, and describes not only typical London municipal housing schemes but also such isolated projects as Letchworth. He has a chapter on costs of dwellings of various sizes and of local improvements and one on planning residential neighborhoods and controlling building densities.

A Decade's Waterborne Typhoid Outbreaks

THE SIGNIFICANCE OF WATERBORNE TYPHOID FEVER OUTBREAKS, 1920-1930—By Abel Wolman and A. E. Gorman, with a foreword by Thomas Parran, Jr., M.D., Commissioner of Health, State of New York. Baltimore: The Williams & Wilkins Co. Cloth; 6x9 in.; pp. 82; tables and graphs. $2.

NEVER BEFORE has so extensive a study of waterborne outbreaks of typhoid fever been made as the one recorded and analyzed in "The Significance of Waterborne Typhoid Fever Outbreaks, 1920-1930." A portion of the summary and comment given in the book was presented by the authors, Abel Wolman and Arthur E. Gorman, at the 1930 annual meetings of the American Public Health Association, but the book just published contains a more extended analysis as well as all the detailed reports gathered by the authors from state and provincial boards of health in the United States and Canada—all the 48 states except South Carolina and the more important six of the eleven provinces.

The period covered in detail is the decade 1920-1929, for which the reported outbreaks of waterborne disease, including some of dysentery only, totaled 242 for the United States and 40 for Canada, with nine states and the District of Columbia and three provinces in which no outbreaks were recorded. A few outbreaks outside the United States and Canada are noted in the text. The detailed exhibit shows by states and provinces the city, town or *institution* in which an outbreak occurred, the corresponding population, year and month, the typhoid cases and deaths, dysentery cases, nature of source of water supply, whether and how treated, cause of the outbreak and general remarks. Among the 23 analytical tables is one showing the distribution of the outbreaks in each state by years, another the distribution by main causes.

A question too large to discuss here is why the authors should have laid the greater part of the onus for 242 outbreaks here and 40 in Canada on lax water supply and health supervision in the smaller places instead of putting it on all places in which these outbreaks occurred, regardless of size? The authors urge that 65

and 78 per cent, respectively, of the outbreaks were in places of 1,000 to 5,000, but they barely mention the fact that small places exceed the large ones in number. Had this been investigated, it would have shown for the United States an outbreak incidence of about 1 per cent in the smaller places, steadily mounting to 50 per cent in the largest group! Further study of these points seems to be needed, but such considerations are minor compared with the value of the book as a whole and its strong evidence that work to prevent typhoid outbreaks, in places large and small, should be increased instead of relaxed.

Taxation Reform and State Aid

FULL VALUE REAL ESTATE ASSESSMENT AS A PREREQUISITE TO STATE AID IN NEW YORK—By Chester Baldwin Pond, Ph.D., New York State Fellow in Taxation at Cornell University, Research Investigator, New York State Tax Commission. Special Report No. 3 of the New York State Tax Commission, Albany, N. Y. Paper; 6x9 in.; pp. 189; tables and line cuts.

CONCERN over the rising tax burden has led the New York State Tax Commission to undertake several important studies with the aid of research investigators holding fellowships at some college or university. The glaring injustice to many individual taxpayers, and also to some cities and towns, caused by inequalities in the percentage of local assessed valuations to real values (full valuation being demanded by law), led to a study of these inequalities in New York state and to the proposal that is the subject of the commission's third report: that state aid to localities be conditioned on full valuations of the property assessed. As bearing upon this thesis, Dr. Pond summarizes "conditioned" federal and state aid in the United States, Canada and Great Britain. None of this aid has full assessed valuation as a condition, but the author argues that it tends to show the practicability of his plan, notably in view of the state aid and the return of portions of state taxes to localities, both of which would be cut off under his plan. Aside from its bearing upon his plan, the author's data on conditioned federal and state aid are valuable. They will also be startling to those not aware of the extent and nature of such conditioned aid. The report as a whole is a valuable contribution to the literature on the ever-alive subject of taxation.

Eccentrically Loaded Columns

REVIEWED BY ODD ALBERT
Structural Engineer, East Orange, N. J.;
Formerly Professor of Mathematics. West College, Sweden.

EXCENTRISCH BEANSPRUCHTE SAULEN, III. Beliebige Excentrizität, Versuche mit Holz- und Stahlsäulen. With an English summary (10 pp.)—Von A. Ostenfeld, Laboratorium für Baustatik der Technischen Hochschulu, Kopenhagen. Distributor, G. E. C. Gad, Vimmelskaftet 32 Kopenhagen. Paper; 6x9 in.; pp. 106. 4 kroner.

TWO former bulletins on eccentrically loaded columns published by Prof. Ostenfeld in 1929 and 1930 treated cases where the point of application of the load was supposed to lie in the first principal axis of the column section, so that the deflection took place about the axis of least moment of inertia. In the bulletin now under consideration an arbitrary point of application of the force has been assumed, with the special case of having this point on the second principal axis. Also bending forces at right angles to the column axis have been taken into consideration.

It is found in the case of arbitrary eccentricity that the deflection curve will not always be located in the same plane as the bending moment, and will more often not be a plane curve at all. It is stated that the column also will have a torsion, which will shift some small part of the bending moment from the first to the second principal axis and then, as the column supports generally prevent any twisting at the ends, it will give rise to additional normal stresses, and finally, in case of eccentricity in the second principal axis only, it may cause the failure of the column by buckling.

The author describes very clearly how tests are made and also how formulas are derived to agree with these tests. Reference is made to S. Timoshenko and his paper "Sur la Stabilité des Systèmes Elastiques" (Paris, 1913). Several curves are plotted and derived, and as a conclusion a revised Euler curve and a 2d-4th degree parabola are given to use for different loading conditions.

Prof. Ostenfeld, who can write in Danish, German, English or French and who has chosen German for the monograph now being noticed, has thoughtfully provided a summary in English that will enable a reader with only slight knowledge of the German language to understand the complicated deviations by comparisons with the summary.

Indian Papers on Railway Practice

TRACK PRACTICE ON AMERICAN AND CANADIAN RAILWAYS—By A. F. Harvey, Engineer-in-Chief, Surveys and Construction, Eastern Bengal Railway. Technical Paper No. 279, Railway Board of India. Calcutta: Government of India, Central Publication Branch. Paper; 6x9 in.; pp. 23; illustrated. 9 annas (1s.).

TUBE RAILWAY CONSTRUCTION — By H. G. Salmond, A.M.I.C.E., Executive Engineer, Eastern Bengal Railway. Technical Paper No. 278, Railway Board of India. Calcutta: Government of India, Central Publication Branch. Paper; 6x9 in.; pp. 42; illustrated. 12 annas (1s. 3d.).

MR. HARVEY summarizes the replies of several railway engineers and others to a questionnaire that he distributed some time in advance of his visit. He also deals with the problem of transverse fissures in rails and expresses the opinion that the railways of India will have to adopt some special quality of steel or some form of heat treatment for their 115-lb. rails, if not for the 90-lb. sections. For this reason he suggests that the Indian Track Standards Committee should keep in close touch with the American Railway Engineering Association to take advantage of the latter's work and avoid duplicating its investigations. Mr. Salmond deals entirely with the tube railways of London, including the surveys, excavating methods, tunneling shields, erection of lining and track construction.

Hydrology in Water Pollution Study

WATER POLLUTION RESEARCH: Technical Paper No. 2, Survey of the River Tees, Part I. Hydrographical. By H. T. Calvert, Director of Water Pollution Research, (British) Department of Scientific and Industrial Research. London: H. M. Stationery Office. Paper; 8x13 in.; pp. VIII. 35 plates of diagrams and folding colored map. 5s. in England; $2.20 from British Library or information, 551 Fifth Ave., New York City.

ALTHOUGH for a century or more Great Britain has had a succession of royal commissions created by Parliament to investigate water supply and sewerage problems, the first permanent body created to conduct such studies was the Water Pollution Research Board, formed in June, 1927, as a branch of the Department of Scientific and Industrial Research. The board took the River Tees for study, as a stream partly tidal, flowing through an industrial area and then subjected to pollution by city sewage and industrial wastes. Biolog-

ical, chemical and hydrological surveys of the river were begun in April, 1929. The latter is the subject of the report now available. The report is largely taken up with tables and diagrams giving observations on current speeds at different depths and on volumes of flow during flood and ebb tides. Silt deposition is given a few paragraphs of text. Among the conclusions drawn from the survey are: that polluting matter cannot escape seaward easily unless it is in the surface layer of the stream; that measurement of currents by means of floats is not suitable for a tidal estuary, where the water is divided into layers and a float might take many days to reach the sea even if it were not caught up in an eddy; and that in future surveys of an estuary attention should be directed to obtaining accurate measurements of the thickness of the upper layer.

A New Theory of Subsoil Flow

PAPER AND DISCUSSIONS ON SUBSOIL HYDRAULICS read before the Punjab Engineering Congress of 1930—No. 138: *Hydraulic Gradients in Subsoil Water Flow in Relation to Stability of Structures Resting on Saturated Soil.* By Ajudhia Nath Khosla, B.A., I.S.E., A.M.I.E. (Ind.) No. 140: *Exponential Law of Subsoil Flow.* By Dr. N. K. Bose, M.Sc., Ph.D. No. 142: *Stability of Weirs and Canal Works:* an application of the new theory of hydraulic gradient by Mr. Khosla, as above. Cloth; 6x9 in.; pp. 40, 13 and 33; halftones, figures in the text and folding plates of drawings. For copies address A. N. Khosla, I.S.E., Executive Engineer, Officer on Special Duty, Punjab Irrigation Secretariat, Lahore, Punjab, India.

IN 1930, at the Punjab Engineering Congress in India, three lengthy papers were presented dealing with the subject of foundation stability and saturated soils. Those three papers have been reprinted and assembled in a little book that deserves careful study. In the first paper A. N. Khosla describes the studies made in conjunction with cracking and settling of the concrete aprons of irrigation siphons. An analysis of the observations made on a number of test wells to determine the groundwater level indicates that a modification should be made in the commonly accepted theory of groundwater flow. Briefly, the major conclusion is that the horizontal velocity of the flowing water is a maximum near the surface and decreases with depth below ground. N. K. Bose in the second paper develops an exponential formula representing the general law of subsoil flow. Darcy's law is shown to be a special form of this general law and holds true only at the surface. The last paper is an application of the theories previously developed to an analysis of the forces acting upon existing irrigation siphons. Unfortunately, the typography is poor and there are frequent examples of careless proof reading, but we are informed that the text is to be rewritten to include later data so that these slight handicaps should be eliminated.

Hydraulic Tables in the Metric System

TABELLENBUCH FÜR DIE BERECHNUNG von Kanälen und Leitungen sowie die Feststellung ihrer Durchflubgeschwindigkeiten Durchflubmengen und Durchflubhöhen, der Konstruktiön der Lichtprofile mit ihren Leistungs- und Geschwindigkeitskelten, Durchflubmengen und Durchflubhöhen, ver Konstruktion Radien bie dem Entwerfen von Kanalisations- und Wasserversorgungsanlagen, Grundstücksentwässerungen, Be-und Entwässerungsleitungen, bei Mellorationsbauten und dergleichen—Bearbeitet und herausgegeben von E. Wild, Magistrats-Oberbaurat, Berlin-Schöneberg, unter Mitwirkung von O. Schöberlein, Stadtbaumeister, Berlin-Steglitz. Berlin: Julius Springer. Cloth; 7x10 in.; pp. 109; tables and graphs. 25.5 marks.

IF ENGINEERING PRACTICE in the United States were based on the use of the metric system of units, this splendid set of tables would be a valuable tool in the office of every hydraulic engineer. As such is not the case, American engineers will probably find little use for it, as discharge figures are given in liters per second and dimensions in meters. It is reminiscent of Swan and Horton's "Hydraulic Diagrams" in that it gives the hydraulic elements for conduits and canals in convenient form for purposes of design. For circular conduits, flowing full, discharge quantities and velocities are given for eighteen diameters, up to 2.0 m., and 140 different slopes. Egg-shaped conduits with eighteen sizes and 144 slopes, compressed-egg shapes having the maximum vertical and horizontal dimensions equal, and horseshoe shapes follow. Several pages are then devoted to tables of wetted perimeter, prism area and hydraulic radius at part depth in terms of the half-width for the four types of conduits considered. The last 52 pages give these same elements in absolute quantities together with discharges and velocities at unit slope. All the computations are based on the modified Kutter formula:

$$v = \frac{100R}{0.35 + \sqrt{R}}\sqrt{i}$$

Municipal Ownership Study

THE ADMINISTRATION OF MUNICIPALLY OWNED UTILITIES—By Delos F. Wilcox, Ph.D. New York: Municipal Administration Service, 261 Broadway. Paper; 7x10 in.; pp. 80. 50c.

BEFORE his death the late Dr. Wilcox outlined a book of 27 chapters covering the administration of municipal utilities and discussing the relative prevalence, advantages and disadvantages of public and private ownership, state regulation, customer and employee ownership, and various methods of establishing municipal ownership. He also took up capitalization and rate problems and many other branches of the subject. This outline has been edited and supplemented (notes) by H. M. Olmsted, associate editor of *The American City*, a one-time associate of Dr. Wilcox. Most of the chapters are sufficiently worked out to give a complete idea of Dr. Wilcox's opinions. As those acquainted with his extensive writings know, he was strongly in favor of municipal ownership, questioned the efficiency of state regulation of privately owned utilities and believed that as regards those municipally owned state regulation should be closely restricted. A valuable feature of the monograph is a condensed statement of the pros and cons of various mooted questions.

Publications Received

THE CENTENARY of the Baldwin Locomotive Works, Philadelphia, Pa., is reviewed in its April quarterly, which contains also articles on the Alaska Ry., the Suisun Bay bridge of the Southern Pacific Ry. and the use of American motor track-cars on foreign railways.

REPRINTS from the April *Bulletin* of the National Sand & Gravel Association, Munsey Building, Washington, D C., are: "Deleterious Substances in Concrete Aggregates," by F. C. Lang, Engineer of Tests and Inspection, Minnesota Department of Highways; and "Utilization of Finer Sizes of Gravel in Concrete Highway Construction," by Bert Myers, Engineer, Materials and Tests, Iowa State Highway Commission. Paper; 8x11 in.; pp. 6 and 7; tables, line cuts and halftones.

MAKERS AND USERS of cement and concrete will be interested in two Engineering Experiment Station bulletins from Kansas State College, Manhattan, Kan.: "Volume Change of Concrete," by C. H. Scholer, Professor, and E. R. Dawley, Associate Pro-

fessor of Applied Mechanics; and "A Study of Fourteen Brands of Standard Portland Cements and Four Early-Strength Cements," by Professor Scholer and L. H. Koenitzer, Instructor in Applied Mechanics. Paper; 6x9 in.; pp. 16 and 13; halftones, tables and line cuts.

WATER POWER EXPLOITATION IN GERMANY, the English edition of a special publication prepared for the World Power Conference in Berlin, is now available for distribution in this country. A review of the book was published in our issue of July 17, 1930, p. 107. Copies may be obtained from the American Committee, World Power Conference, 405 Lexington Ave., New York City, for $5, including postage and customs.

PUBLIC WORKS ADMINISTRATION IN HAITI during the ten years from 1921-30 is reviewed in a public document that also includes the annual report for 1929-30 of the engineer-in-chief, Commander G. A. Duncan (C.E.C.), U. S. Navy. The work of construction and operation carried on under the treaty between the Republic of Cuba and the United States includes public buildings, irrigation works, roads, water supply and other municipal services. Most of the staff is native. The volume is an English translation, is extensively illustrated and is published at Port-au-Prince, Haiti.

RAILWAY INTERLOCKING of switches and signals is the subject of a 65-page illustrated pamphlet issued by the American Railway Association, Signal Section, as Chap. 16 of the forthcoming book on "American Railway Signaling Principles and Practice." Besides descriptions of various locking systems and apparatus there are particulars of derails and drawbridge locks. Its price (from R. H. C. Balliet, secretary, 30 Vesey St., New York, N. Y.) is 25c. for members and 35c. for non-members, while the price of the set of 13 chapters now available is $2.60 and $3.90 respectively, or $1 additional with binder.

CITY PLANNING AND ZONING in the United States to the close of 1930, as regards the number of planning commissions, the number of cities having zoning ordinances and state enabling acts, are reviewed in four mimeographed bulletins published by the Division of Building and Housing, Department of Commerce, Washington, D. C. "A Tabulation of City Planning Commissions in the United States" and "A Survey of City Planning and Related Laws" were compiled by Lester G. Chase, while Norman L. Knauss compiled "Zoned Municipalities in the United States" and "Survey of Zoning Laws and Ordinances Adopted During 1930." All four bulletins contain not only the details indicated by their titles but also comprehensive and interesting summaries, some of which are by states and some chronological. (Free on application to Department of Commerce, Washington, D. C.)

THE HUAI RIVER COMMISSION, Bureau of Engineering (Huai-Yin, China), has issued a report, printed in both Chinese and English, outlining "Projects of the Flood Control, Navigation and Irrigation for the Huai River System." The letter of transmittal, by H. Li, chief engineer and commissioner, is dated May 31, 1930. A prefatory note by Chiang Kai-shek, chairman of the commission, dated Jan. 1, 1931, states that the project outlined in the report has been adopted by the commission and submitted to the national government, and will be executed as soon as funds are provided. Prof. Otto Franzius, of Hannover University (Germany), served as consulting engineer. The project includes a flood channel from the Huai River to the Yanztze Kiang, movable dams at the head of the channel and various other works for flood control, irrigation, navigation and water power. A five-year working program for the first stage of development, at a total cost of nearly fifty million (Mexican) dollars is presented.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

AMERICAN CIVIC ANNUAL: A Record of Recent Civic Advance With a List of Who's Who in Civic Achievement—Edited by Harlean James, Executive Secretary, American Civic Association. Washington, D. C.: American Civic Association, Inc., Union Trust Building. Cloth; 5x8 in.; pp. 350; halftones. $3.

Reviews progress in national parks and forests, housing, regional planning, state parks and highways, and various municipal activities.

ANEMOMETER FOR A STUDY OF WIND GUSTS—By R. H. Sherlock, Associate Professor of Civil Engineering, and M. B. Stout, Assistant Professor of Electrical Engineering, University of Michigan. Ann Arbor: Department of Engineering Research, University of Michigan. Paper; 6x9 in.; pp. 38; halftones and line cuts. $1.

Describes an electric pressure-plate anemometer and its use in studying wind pressure on wires and poles of an electric power line.

BUILDING CODE AND PLUMBING CODE TABULATION—Compilation by Division of Building and Housing, Bureau of Standards, U. S. Department of Commerce, Washington, D. C. Paper; 8x11 in.; 45 pp.; mimeographed. Free on application.

For places of 5,000 population and more gives date of adoption of building codes in 1,187 cities and of plumbing codes in 817 cities; also whether codes are under revision and (for building codes only) nature of revision. Division has on file data for nearly 500 other cities, from 1,000 to 5,000 population.

THE CHOICE OF A BUILDING CONTRACT—By Morton C. Tuttle, President, Morton C. Tuttle Co., Park Square Bldg., Boston. Boards, cloth back; 7x10 in.; pp. 46. $1.

A handsomely made brochure described on the cover as "a non-technical and frank discussion of the merits and defects of the various forms of contract commonly used in building and engineering operations."

CONGRES INTERNATIONAL DE LA CONSTRUCTION MÉTALLIQUE, Liége, 1930: Comptes rendus des Séances Techniques; Conclusions Générales—A. De Marneffe, Professeur à l'Université de Liége, Secrétaire-Général. Paper; 9x11 in.; pp. 101; line cuts.

CONTROL OF FLOODS IN THE PASSAIC RIVER: Special Report 2, Part 2, Technical Details, State Water Policy Commission of New Jersey, 605 Broad St., Newark. Paper; 6x9 in.; pp. 117; tables and maps, many folding.

Besides descriptive, tabular and graphical data on seven Passaic flood projects studied by the commission named above, this reviews earlier reports and gives much hydrological information.

THE COST OF COUNTY GOVERNMENT: An Analysis of the Expenditures of Wayne County, 1926-1930—Prepared by the Department of Systems and Reports under the direction of the Board of Wayne County Auditors, Wm. Gutman, Secretary, Detroit, Mich. Paper; 6x9 in.; pp. 24.

Unique and highly creditable report. Text explains yearly increases. Tables give detailed expenditures by years and per cent of total for each item. Total cost has doubled in five years, due chiefly to road construction, welfare work and growth of reserve fund for delinquent taxes. Latter ranged from $119,000 to $163,000 in first four years of period, then jumped to $1,146,000.

ECONOMICS FOR ENGINEERS—By Edison L. Bowers, Ph.D., Assistant Professor of Economics, and R. Henry Rowntree, Instructor in Economics, Ohio State University. New York and London: McGraw-Hill Book Co. Cloth; 6x9 in.; pp. 490; 43 line cuts. $4.

EFFECT OF BUILDING MATERIALS ON PAINT FILMS—By H. M. Llewellyn, B.Sc., A.I.C. Building Research Bulletin No. 11, Department of Scientific and Industrial Research. Paper; 6x9 in.; pp. 4, 6c. from British Library of Information, 551 Fifth Ave., New York City; 2d. from any H. M. Stationery office.

Confined to "wall plasters, portland cement renderings and asbestos cement sheets" treated with "ordinary oil paints and washable distempers."

EFFECT OF CALCIUM CHLORIDE as an Admixture in Portland Cement Concrete—Investigation in Cooperation with the Calcium Chloride Publicity Committee, by R. C. Sloane, Professor of Civil Engineering; W. J. McCaughey, Professor of Mineralogy; Wilder D. Foster and Carl Shreve, Cooperative Fellows, Ohio State University. Paper; 6x9 in.; pp. 81; illustrated. 50c. from Ohio State University, Columbus, Ohio.

THE ENGINEER'S YEAR BOOK FOR 1931: A Compendium of the Modern Practice of Civil, Mechanical, Electrical, Marine, Gas, Aero, Mine and Metallurgical Engineering. 38th annual issue, revised under the direction of the editor of *The Engineer*. London: Morgan Bros.; Trade Agents, Crosby Lockwood and Son, Ludgate Hill, London, E.C. 4. Flexible; 5x7 in.; pp. 3,043, including advertisements. 31½s. in England.

New material, except where not affecting pagination, inserted at ends of the various sections and seems to be slight. For detailed plan of 1930 issue by Prof. A. M. Greene, Princeton University, see *Engineering News-Record*, Dec. 25, 1930, p. 1,019.

ESTIMATING BUILDING COSTS—By Frank E. Barnes, C.E., M.Am.Soc.C.E., M.A.A.E., Building Valuation Engineer of the New York Central Lines. Third edition. New York and London: McGraw-Hill Book Co., Inc. Flexible; 5x7 in.; pp. 656; many halftones, line cuts and tables. $5.

IRRIGATION DISTRICTS: Their Organization, Operation and Financing—By Wells A. Hutchins, Irrigation Economist, Division of Agricultural Engineering, Bureau of Public Roads. Technical Bulletin 254, U. S. Department of Agriculture, June, 1931. Paper; 6x9 in.; pp. 94; tables and graphs. 15c. from Superintendent of Documents, Washington, D. C.

Brings to Dec. 31, 1928, information given in a bulletin of 1923, coming down to Dec. 31, 1921, of 801 districts (some now inactive), organized in 1887-1928, 168 in California, 120 in Washington and 96 in Idaho. Of appeal both to those interested in irrigation and in quasi-municipal organizations for the construction and operation of public works.

MANUAL OF STREET SANITATION RECORDS, Including Other Public Works Activities for Cities of 25,000 to 500,000 Population as Installed in Kenosha, Wis., July, 1931. Chicago: Committee on Uniform Street Sanitation Records, 923 East 60th St. Paper, cloth back; 8x11 in.; pp. 81 (mimeographed); extra pages of forms. Free on application.

Second in a series of five manuals, the first of which, dealing with the smaller city of Brunswick, Ga., was noted in our issue of June 18, 1931, p. 1,024. The present manual includes some public activities other than street sanitation and takes up model budgeting, accounting, purchasing and central store systems.

OHIO WATER SUPPLIES With Particular Reference to the Drought of 1930—Supplement to Vol. III, No. 3, *Engineering Experiment Station News*, June, 1931. Paper; 6x9 in.; pp. 63; line cuts. Apply to Director Experiment Station, Ohio State University. Columbus, Ohio.

Contains eleven papers on the subject mentioned and related matters; also a list of public water supplies in the state, compiled by the Ohio Department of Health.

REFUSE DISPOSAL IN AMERICAN CITIES—A report compiled by Civic Development Department, Chamber of Commerce of the United States, Washington, D. C. Paper; 8x11 in.; pp. 41; tables. Apply to C.C.U.S., as above.

A brief critical review of methods together with short summaries of tables published in 1930 in *Municipal Index and Public Works* together with descriptive and cost data for reduction works and incinerators collected for this report.

SANITARY DRINKING FACILITIES: With Special Reference to Drinking Fountains—By Marie Correll. Paper; 6x9 in.; pp. 28. 10c. from Superintendent of Documents, Washington, D. C.

Concise review of the subject, with recommendations following those of American Public Health Association. Summarizes Women's Bureau study of drinking-water facilities at many industrial plants, showing large percentage of poor facilities. Summarizes state legislation against common drinking cups.

TESTS OF WELDS: Report of an Investigation by the Engineering Experiment Station, University of Illinois, in Cooperation with the Chicago Bridge & Iron Works—By Wilbur M. Wilson, Research Professor of Structural Engineering. Paper; 6x9 in.; pp. 37; illustrated. 20c. from University of Illinois, Urbana, Ill.

WHO'S WHO IN GOVERNMENT: Supplement to Vol. I—New York: The Biographical Research Bureau, 460 W. 34th St. Stiff paper; 7x10 in.; pp. 58. Free to subscribers to Vol. 1.

Condensed biographical sketches of newly chosen officials and of persons omitted from the first issue of Who's Who in Government. *E.N.-R.*, Jan. 15, 1931, p. 121.

LETTERS TO THE EDITOR

Mount Vernon Memorial Highway

Sir—I have read with much pleasure the excellent article on the Mount Vernon Highway and the editorial comment that appeared in *Engineering News-Record* July 23, 1931, p. 124.

In the personal mention at the end of the article I missed the names of our two consultants to whom we owe a great deal for their helpful advice, and I wonder if it is yet too late to give these gentlemen and two others of our own force the recognition they deserve.

Mention should be made of Jay Downer, chief engineer, and Gilmore D. Clarke, landscape architect, both of the Westchester County Park Commission, who served as consultants; and J. V. McNary, senior highway bridge engineer, and Wilbur H. Simonson, senior landscape architect, of the bureau, who rendered important service in the design of the bridges and the landscaping. THOMAS H. MACDONALD,

Washington, D. C., Aug. 4, 1931. Chief of Bureau of Public Roads.

Estimates of Savings in Automobile Costs on Highways Usually Too High

Sir—The article by N. D. Douglas (*ENR*, Aug. 6, 1931, p. 214) on operating automobiles at three cents a mile is one of the first (to the writer's knowledge) that has appeared suggesting a reasonable basis for capitalizing distance reduction on highways. For several years the writer has held that the 6c. to 10c. generally used to estimate the cost per vehicle over an additional mile of road was entirely too optimistic for those desiring to spend money for eliminating distance on our state highways. (Yet the writer would be one of the last to be quoted as favoring a reduction of this work.) Operating costs of automobiles over additional distance should include only the additional gasoline, oil, tires and maintenance. Depreciation might be included, but it is better to justify the cost of the reduced distance on these four items only. License fees, insurance, garage rent and depreciation are fixed charges whether the car operates 5,000 or 50,000 miles per year, and they will be paid whether the car is used for business or pleasure.

People estimate the time required to drive to a given destination rather than the number of miles. Ten or fifteen minutes more or less consumed in the trip is usually immaterial. While it is no doubt true that some vehicles and some drivers might suffer a loss of $3 per hour due to delay on the highway (as reported and used by the Cook County survey of highway transport a few years ago), yet it is inconceivable that this figure should be applied to anything like the number of vehicles using the road. The Ohio transport survey found, I believe, that only about half of the passenger-car mileage was for business. It might be well, therefore, to figure a small charge against time lost in additional distance or delays, although it must be remembered that time consumed on additional distance is not the same as time lost on unavoidable delays. Perhaps the highway economist ought to follow the example of the railways in refunding for lateness on extra-fare trains; that is, the train must be more than a published amount late before anything is paid, and no refunds are made for a few minutes' lateness in arriving at the destination.

In conclusion, I would like to cite the operating cost for the past three years on one of my own cars, complete records for which have been kept. During this time the car (a four-cylinder Whippet) averaged only 6,000 miles per year, being used as a "second" car. It was operated almost exclusively on hard-surfaced streets and roads. The tabulation follows the plan on p. 215 of the Aug. 6 issue.

Miles per gallon of gas	20.0	Gasoline, cents per mile	.93
Miles per quart of oil	129.0	Oil, cents per mile	.20
Gas cost, cents per gallon	18.8	Maintenance, cents per mile (including grease)	.46
Oil cost, cents per gallon	25.6	Tires	.24
		Total	1.83

It might be of interest to note that 0.18 of the 1.83c. per mile operating cost went to the gasoline tax.

Since it is difficult to get operating costs on privately owned automobiles, I trust this will serve to substantiate Mr. Douglas' statement that 3c. per mile is not too small for capitalizing distance. S. B. FOLK,

Columbus, Ohio, Aug. 11, 1931. Assistant Professor of Mechanics, Ohio State University.

Specifications for Precast Asphaltic Sewer Joints

Sir—As a result of the article on the use of precast asphaltic sewer joints published in *Engineering News-Record*, June 11, p. 976, I have received requests from various parts of the United States regarding details of the joint and jointing material. For this reason I believe many engineers will be interested in the following specifications for this type of joint.

Unless otherwise specified, all sewer pipes should be jointed with bituminous joints prepared in the following manner: Sewer pipes should be fitted with self-sealing joints, made by casting onto the spigots and into the sockets of all pipes collars of a mastic compound composed of 40 per cent Petrolastic or its equal, and 60 per cent approved filler of ground inert mineral matter that will pass a 100-mesh screen.

The compound should be flexible at freezing, softening at 212 deg. F. and flowing at 300 deg. F. It should possess a proper degree of hardness to prevent penetration of root growth and still allow sufficient resiliency to withstand slight ground movement and distortions. Penetration should show by a test at 77 deg. F. to be not under 7 and not over 9.

The compound is mixed and cast at approximately 400 deg. F. The collars have a taper of 1 to 20 and fit perfectly when the spigot end of the pipe is "shoved home" into the socket. All pipe should be clean and absolutely dry when the collars are cast thereon. The mixing of the compound and the casting of the collars should be done under the supervision of the engineer.

To make the collars soft or tacky they should be painted with two coats of Oronite priming solution or its equal. The first coat is applied approximately 30 min. before and the second coat immediately preceding laying.

Any material adhering to the collars, either before or after the painting, which would tend to prevent the proper sealing of the joint, should be removed. When laid, the pipes must be shoved home, causing the two collars to become a homogeneous mass.

The methods used in laying the pipes should have the approval of the engineer. E. FRENCH CHASE,

Seattle, Wash., July 22, 1931. Sanitary Engineer, Department of Streets and Sewers.

NEWS OF THE WEEK

Bids for Dotsero Cutoff to Be Received About Sept. 1

Bids will be received about Sept. 1 for the construction of the 42-mile Dotsero cutoff by the Denver & Rio Grande Western R.R. Refinements as to location of the line to reduce the original 10-deg. curves to 6 deg. have been completed by the engineering staff on less than one-third of the line, but this engineering work will not hold up the letting of contracts, since work could now begin on the less difficult sections. The date of receiving bids, which will be on a unit-price basis, is contingent upon receipt of formal permission from the Interstate Commerce Commission to build the cutoff. No delay is expected, as this construction was one of the conditions imposed by the commission in approving purchase of the Moffat road by the D.&R.G.W. (see *ENR*, Aug. 6, p. 213).

Charge of Unsatisfactory Work by Private Architects Disputed

The charge made recently by Ferry K. Heath, assistant secretary of the treasury, that government architects are more satisfactory than private architects lacks proof, according to Robert D. Kohn, president of the American Institute of Architects. In order to speed up the preliminary work on government buildings during the present emergency so that the buildings can be put under contract the architectural profession last year fostered and obtained the passage of a bill authorizing the government to employ private architects for federal buildings. Despite this authority no great amount of work has been turned over to private concerns, and Mr. Heath's charge was in answer to the urgings of the architectural profession that more outside men be employed.

"The answer may be," states Mr. Kohn," that the treasury department staff has developed a certain way of doing things, and the system thus established does not easily adjust itself to the architects who have been called in from outside to work with the department. There is probably the usual kind of governmental procedure established by long custom, involving methods by which everything must be done and which really cause the main delay."

More Changes in Personnel in St. Louis Water Department

More changes in the personnel of the St. Louis, Mo., water department since the recent discharge of Leonard A. Day as water commissioner (*ENR*, Aug. 6, p. 228) have been announced. Elton E. Easterday, division engineer in charge of water supply and purification since 1913, and John D. Fleming, chief chemical engineer of the department, who has been with the division since 1914, have been dismissed "for the good of the service," according to John C. Pritchard, director of public utilities.

Acme Photo

ARMY ENGINEERS BUILD A PRACTICE BRIDGE

While in camp at Fort DuPont, Del., the First Engineers, U. S. Army, constructed this pontoon bridge across the Delaware & Chesapeake Canal. They used a new type of metal pontoon that has been recently developed for this purpose. The illustration shows a 23-ton tank midway across the structure.

Water Still Rising in Yangste River

In a telegram dated Aug. 16 the consul general at Hankow, China, reports that the water level of the Yangste River is 52 ft. 9 in. and is still rising; that the dikes at Wuchang have broken; that the Japanese concession is flooded; that electric current in the ex-German concession has failed; that uneasiness is felt with regard to the power supply of the whole city; that the ice plant has ceased operation; that the two English language newspapers at Hankow have been forced by the high water to discontinue publication; and that the foundations of all buildings at Hankow are undergoing tests to which they have not been subjected before.

News dispatches dated Aug. 19 state that at least several hundred residents of Hankow were drowned when the big Chiakow dike protecting the city's western suburbs collapsed, inundating the principal native industrial district, including big flour, cotton and silk mills. An accurate estimate of the number that perished was not possible in view of the chaos that prevailed following the disaster. All the foreign residents of Hankow are reported safe.

New High-Speed Electric Line to Meet Philadelphia System

The finance committee of the new Delaware River Joint Commission has decided to float a $44,000,000 bond issue in the fall, devoting $10,000,000 of the proceeds to the construction of a high-speed electric line over the Delaware River Bridge to connect with the Philadelphia subway-elevated system. The remaining sum will be used to pay off the bridge indebtedness to New Jersey, Pennsylvania and Philadelphia.

It is contemplated to extend the high-speed rail transit system from Eighth and Race Sts., Philadelphia, to Broadway and Carman St., Camden. At Eighth and Race Sts. the line would connect with the Eighth St.-Locust St. subway now nearing completion. The effect of the improvement would be the extension of the Philadelphia subway system into the business heart of Camden, with the terminus alongside the Broadway station of the Pennsylvania Railroad.

Informal estimates have been made that the total cost of the improvement will be about $10,000,000. No definite plans have yet been prepared, because these must wait upon an agreement being made between the Joint Commission and the Philadelphia Rapid Transit Co., which will operate the Eighth St.-Locust St. subway.

Program for New York Meeting of Public Works Officials

The International Association of Public Works Officials will hold its twelfth conference in New York City Sept. 24-26.

An unusually interesting program has been arranged, which includes "School for Public Officials," by William P. Capes, secretary, New York State Conference of Mayors; "The Department of Sanitation of the City of New York," by Leonard C. L. Smith, member, sanitation commission, New York City; "Sewage Disposal," by J. R. McClintock, consulting engineer, New York City; "Taxation—An Urgent Problem," discussion led by Arthur P. Heyer, director of public works, Montclair, N. J., and George E. Cavanagh, superintendent of accounts and finance, Allentown, Pa.; "How Milwaukee Is Able to Have a Surplus of $5,000,000," by C. O. Davis, superintendent of street sanitation, Milwaukee; "Round-Table Discussion on Snow Removal," discussion led by Joseph J. Butler, superintendent, bureau of streets, Chicago, Dean Noyes, street commissioner, Omaha, and E. A. Wood, chief, street cleaning division, department of health, Winnipeg, Canada; "City Planning," discussion led by M. B. Herlong, city commissioner, Jacksonville, Fla., and J. J. Jessup, city engineer, Los Angeles; "Street Lighting," by Alexander Anderson, New York Light & Power Co.; "Municipal Airports," by John Klorer, chief engineer, board of levee commissioners, New Orleans; discussion led by Frank E. Waterman, commissioner of public works, Providence, and Mass S. Murray, director of public works, Kansas City, Mo.

There will also be a report on the international conference on public cleansing, held in London July 27-31, by Robert B. Brooms, director, department of streets and sewers, St Louis, and a report by the committee on uniform street sanitation records, Joseph J. Petranek, Cicero, Ill., chairman.

W. H. Winship, street commissioner, Indianapolis, will read a paper on "Organization—Handling a Public Works Department With the Precision and the Discipline of a Fire or Police Department," which will be followed by a discussion of the subject led by Bernardo Wolf, superintendent, street sanitation and cleaning, Havana, Cuba, and J. C. McAllister, superintendent, sanitary and street department, Fayetteville, N. C.

A trip will be made around New York harbor, there will be a dinner and entertainment on one evening, and the attending ladies will have a dinner and theater party under the auspices of the ladies' reception committee.

Hoover Dam Notes

Advices from Hoover Dam early in the week were to the effect that work was being resumed, although some of the men continue on strike. The week preceding the strike was characterized by cooler weather with a consequent increase in the efficiency of labor. Work was begun on the intake of No. 3 tunnel. Construction on the retaining walls for the Black Canyon highway was begun, as was the work on the road connecting the power company's substation to the Nevada spillway.

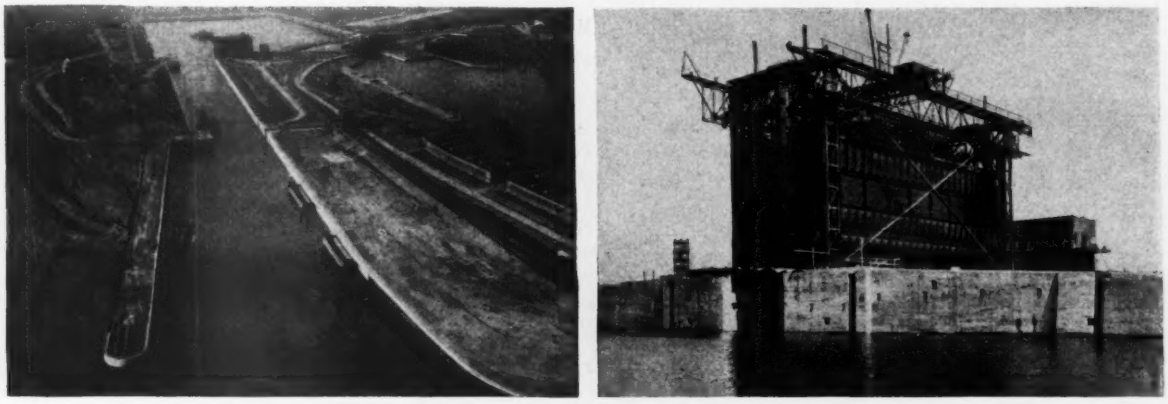
Traffic over the Boulder City-Hoover Dam highway is very heavy. A traffic count covering seventeen hours showed an average of 70 vehicles per hour. The last tunnel on the Boulder City-Hoover Dam railroad is nearing completion. All cuts have been rough finished, with two exceptions, and all steam-shovel work was expected to be completed Aug. 15.

Lining of New Albany Reservoir to Be Reinforced

Use of the new upland water-supply system of Albany, N. Y., has been postponed due to unexpectedly large leakage through the concrete lining of the Loudenville distribution reservoir, located on the northeast edge of the city. This consists of two basins holding 75 million and 25 million gallons, respectively, each of which is lined with concrete. The bottom construction, consisting of two 4-in. slabs separated by several layers of waterproofing membrane, has proved satisfactory, but the side slopes, built of a single 8-in. thickness, have developed considerable leakage through the joints of the 16x40-ft. panels. No percolation through the slabs has been detected, nor is any settlement evident. Joint construction includes a 10-in. continuous crimped copper strip embedded in the concrete and a ½x8-in. premolded bituminous filler. Although only a small proportion of the 41,000 lin.ft. of joints has proved defective, it has been decided to cover the entire surface with a 1½-in. coating of gunite before putting the reservoir into service. This work is being done by the Cement Gun Co., Allentown, Pa. Lining of the smaller basin will require about three weeks; the larger basin will be completed in about three months.

New Low Water Mark May Be Set by Mississippi River

A record low level for the Mississippi River may be set before the end of the summer. The standard of zero was adopted in 1864. Since then only once, in 1910, has the water been below that level. Recent readings taken at the Moline locks by the engineers indicate than an unusually low level will be recorded this summer.



LARGE TIDAL LOCK OPENED TO SERVICE AT BREMERHAVEN, GERMANY

Recently completed port improvements at Bremerhaven, Germany, include a tidal lock 1,220 ft. long, 197 ft. wide and 47½ ft. deep; an approach basin 1,148 ft. long; a 788x1,312-ft. turning basin with a depth of from 42½ to 52½ ft. and a 146-ft. canal leading to an inner basin with docks and a large drydock (not shown) 1,088x135x40 ft. in size. The canal is crossed by a swing bridge, 368 ft. long. The illustration on the left is a general view of the major part of the development; that on the right shows the construction of one of the large sliding lock gates, 148 ft. in length. As the lock rests upon a foundation of sand and soft mud, it was necessary to drive 25,000 piles to support it. These facilities are made necessary by the large amount of silt in the Weser River at Bremen, which makes it impracticable to maintain sufficient depth for large ships.

Program of Boston Meeting N.E.W.W.A.

A tentative program has been announced for the 50th annual convention of the New England Water Works Association, to be held at Boston, Mass., from Sept. 29 to Oct. 2. The morning of the opening day, Tuesday, Sept. 29, will be taken up principally with the business meeting and committee reports. In the afternoon three papers will be presented: "History of the N.E.W.W.A.," by Charles W. Sherman, Boston; "History of the Boston Waterworks," by Frank A. McInnes, Boston; and "Trend of Waterworks Practice in the Past 50 Years," by Caleb M. Saville, Hartford.

Both morning and afternoon sessions on Wednesday will be devoted to problems of the waterworks superintendent. The three principal divisions of the program deal with emergency problems, tuberculation and the relation of waterworks to fire fighting. In the late afternoon the delegates will witness a demonstration of the Boston high service fire-fighting system.

Thursday morning, Oct. 1, will be occupied by a symposium on water purification in New England. In the afternoon the general subject will be "The Allocation of Interstate Waters for Water-Supply Purposes," the speakers including Thaddeus Merriman, New York City, Frank E. Winsor, Boston, and a number of other prominent engineers. The convention will conclude on Friday, Oct. 2, with an excursion over the Metropolitan waterworks system.

22 British Towns to Build Large Activated-Sludge Plant

An activated-sludge plant to treat the sewage of 22 municipalities in Middlesex County, England, with a population estimated at 700,000 in 1930, is a part of a joint sewerage project recently authorized by Parliament. This plant would replace 27 sewage-works now owned and operated by 21 of the 22 places, one small community having no sewerage system. The effluent from all the plants flows into the Thames or its tributaries above London, that from several of the works going into tributaries above the Thames River intakes of the Metropolitan Water Board. The average total dry-weather flow of sewage to the 27 works in 1928, from a total estimated resident population of about 610,000, was 28,500,000 gal. (U. S. standard), or an average of 47 gal. per day. Ministry of health requirements for sewage-works capacity are full treatment for three times and sedimentation only for another three times the dry-weather flow.

The new works will be located at Mogden, which is 5 miles above the boundary of the county of London and 2½ miles below Teddington Weir, at the head of the tidal flow of the Thames. The estimated cost of trunk sewers and new sewage-works up to the close of 1940 is $21,900,000. In addition some $5,400,000 will be paid to the 21 municipalities for the 27 works that are to be abandoned and for land on which the new works are to be located. It is estimated that ultimately the works will treat the sewage from a population of 1,800,000 and that the total capital cost will be more than $29,200,000.

The parliamentary act authorizing the project was promoted by the Middlesex county council, the several municipalities and their engineers cooperating. The project is based on reports made in 1929 and 1930 by John D. Watson, consulting engineer, Birmingham, who for many years was engineer and who is now consulting engineer for the Birmingham, Tame and Rea District. The firm of Dodd & Watson, Birmingham, of which Mr. Watson and his son are members, is now drawing plans and specifications for the project, which will be carried out by the Middlesex county council, which has become responsible for providing all trunk sewers to convey sewage emanating from the districts to be served. The council will levy a charge upon the districts to pay for sewers, treatment works and maintenance in proportion to the assessable value of each district after allowing for a national government grant equal to 50 per cent of the constructional cost of sewers and works.

The communities in the joint district now having sewers are sewered on the separate or the "partly separate" plan. All these sewage-works have sedimentation tanks for the regular sewage flow and many of them have stormwater tanks as well. Three of the works provide sedimentation only; five of the other works have both contact beds and percolating filters; eighteen have percolating filters only and four have contact beds only.

WASHINGTON NOTES

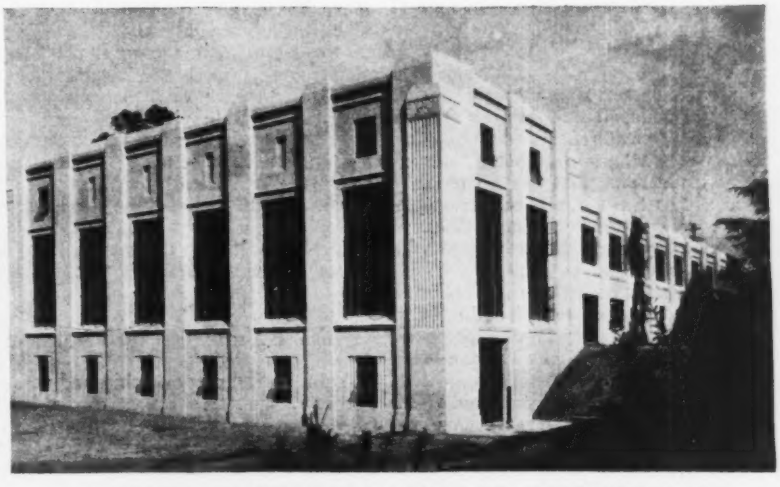
By PAUL WOOTON
Washington Correspondent

Labor Secretary's Decision on Prevailing Wage May Lead to Court Test of Bacon-Davis Law

A COURT battle to test the validity of the Bacon-Davis prevailing wage law probably will be the outcome of a dispute that has arisen in Washington. The first decision rendered by the secretary of labor under the terms of the act was made recently upon the protest of painters employed by the Alliance Construction Co., of New York, which has the contract to paint the new internal revenue building. The act provides that in cases of dispute the secretary of labor shall determine the wage to be paid. In all previous disputes a settlement has been reached without the necessity of intervention by the secretary.

In the immediate case the secretary ruled that the prevailing wage for painters in the District of Columbia is the union scale of $11 for an eight-hour day. It was revealed that the Alliance Construction Co. is paying most of its men between $7 and $8 a day. Officials of the company are reported to have refused to pay the rate fixed by the secretary and to have threatened court action. Since the prevailing wage law is written into every government contract, violation becomes a breach of contract.

Coincident with this dispute the W. P. Rose Co., of North Carolina, has indicated intention of refusing to pay the prevailing wage rate. In both of these cases it is claimed that workers have been brought into the city under



CALIFORNIA MATERIALS LABORATORY NEAR COMPLETION

This new engineering materials laboratory building at the University of California, Berkeley, will house a 4,000,000-lb. universal testing machine and other research equipment, making it one of the best equipped engineering laboratories in the United States. The building has 35,000 sq.ft. of floor space, rooms for testing, equipment, research, conference, control rooms, offices and classrooms. It is a reinforced-concrete structure throughout. George W. Kelham was the architect; Barrett & Hilp were general contractors. The building cost $150,000.

open-shop agreements. Although not mentioning directly the matter of giving preference to local labor, the Bacon-Davis law accomplishes this purpose by indirection, since by requiring the observance of local wage rates it removes all incentive for the importation of cheap labor from other sections.

Opinion prevails in Washington that a court ruling on the validity of the law is desirable.

Time Extended for Briefs in Flood-Control Case

In compliance with a request from the department of justice, the U. S. Supreme Court has granted an extension of 60 days for the filing of the government's brief in the Kincaid flood-control case. Under the original order it was required that the government should file its brief by Aug. 15. The principal question at issue is whether or not the army engineers, in carrying out the adopted flood-control project, can cause water to be diverted through the Boeuf basin of Louisiana without compensating property owners. It has been twice decided in the lower courts that the government must compensate property owners whose holdings lie in the path of the proposed floodway and the government is appealing to the supreme court. The delay has been asked because it is felt that the issue involved is so important that the solicitor general, who at present is out of the city, should review the brief.

Navy to Sound Bartlett Deep

Information concerning the earthquake menace in Nicaragua is expected to result from sounding work that the hydrographic office of the navy department has undertaken in the great Bartlett Deep in the Caribbean Sea between the Bay of Honduras and Guantanamo, Cuba. This depression in the bottom of the sea is 1,000 miles long and from 50 to 60 miles wide. It is known to be an earthquake center, but adequate soundings have never been made. Depths of as much as 4 miles have been recorded by scattered soundings.

Now that attention is being focused on the canal route that has been resurveyed across the Isthmus of Nicaragua by the army engineers, importance is attached to hydrographic work that will trace the fault that is known to transverse Bartlett Deep. It is not believed by government engineers that this fault extends as far as Nicaragua, but accurate information will not be available until the navy has finished its sounding work. Some geologists have contended that the large lakes that will make up an important part of the proposed canal may be drained to subterranean channels by another earthquake.

Because of the extent of the area to be covered in this hydrographic survey, the navy will use a pair of destroyers equipped with sonic depth recorders. The destroyers will be able to cover the area in a shorter time than the Hydrographic Survey craft because of their superior speed.

Structural Engineers Plan First International Meeting

Preparations are under way for the first general congress to be organized by the International Association for Bridge and Structural Engineering, which is to be held in Paris, France, May 19-24, 1932. In developing the plan of the meeting, the officers of the association have selected eight general themes upon which attention will be concentrated. Three of these refer to steel construction, three to concrete and two to composite structures. They may be summarized as follows: (1) Stability and strength of structural members subjected to compression and bending. (2) Slabs in reinforced concrete structures. (3) Welding in steel structural work. (4) Large girder bridges in reinforced concrete. (5) Dynamics of bridges. (6) Statics of reinforced concrete with regard to the properties of the material. (7) Composite steel and concrete columns and girders. (8) Research concerning building ground.

The annual subscription for personal membership in the association is ten Swiss francs, which entitles the holder to receive one copy of all publications. Headquarters of the association are at the Federal Institute of Technology, Zurich, Switzerland.

New Sea Wall for Jackson Park, Chicago

Because of the severe damage by storms and high water, the South Park Commissioners, of Chicago, are extending the shore line and building a new sea wall off Jackson Park. The extension of the shore line is along the southeast side of the park, from 64th to 67th St., the new shore line being about 250 ft. out from the old shore line. The work, started last fall, was continued throughout the winter. Large stones were brought by barge, and unloaded by means of a derrick on the barge. Accurate placing of rock was done by a crawler crane, which handled large stones and boxes of small stones speedily and efficiently. When the job is completed, Jackson Park will have more land, a new shore walk, and a better sea wall than the one battered to pieces the winter before.

Unified Transport for London

A unification of ownership and operation of all the numerous and varied local transportation facilities of the metropolitan district of London is proposed in a bill now before parliament. The plan is to create a passenger transport board which will acquire, operate and coordinate the entire urban and suburban transportation system, including the underground railways, municipal and private street railways, bus or motor coach lines and the steam and electric suburban lines of the trunk railways, with an aggregate annual traffic estimated at nearly 4,000,000,000 passengers. The London county council and a majority of the several companies are reported as having agreed to the general scheme and the terms proposed. The new board is to have a capital of about $650,000,000 and will issue its own securities in exchange for those of the existing concerns that will be acquired.

Big Dock Improvement Plan for Southampton Progressing

Steady progress has been made with the docks extension project of the Southern Railway at Southampton, England. About half of the 7,000-ft. long quay wall is already constructed, and the reclamation of 180 acres of land to the north of it is in hand. Construction of the other half of the quay wall and reclamation of a further 180 acres will be begun immediately. It is expected that at least one new berth 1,000 ft. long will be ready for use this year. The estimated cost of the engineering work to be carried out during 1931 is $6,450,000.

The new graving dock, which it is hoped to have finished by the end of 1933, is being built to accommodate the 73,000-ton Cunard liner now under construction and other huge vessels of the future. The dock will be 1,200 ft. long, 135 ft. wide at entrance, and 45 ft. deep from high water level of neap tides to blocks, or 48½ ft. from high-water level of spring tides to blocks. The work to be carried out this year will cost $1,250,000.

The approach channel to seven berths in the River Itchen to accommodate new vessels which will soon be using the berths will be deepened.

More "Prevailing Wage" Delays

The Illinois state division of highways has invited bids for numerous road and bridge jobs on Aug. 18, but has issued a notice to contractors stating that as protests have been filed relative to the prevailing rates of wages as advertised for a number of the counties in which such proposed work is located bids will be received on Aug. 18 only for such sections as are located in Cook, Lake, Kane and DuPage counties. Bids for all the advertised work located in other counties will be received Sept. 1.

Concrete Pavement Yardage

There is given below a tabulation of concrete pavement yardage awarded in the United States during the month of July, divided according to roads, streets and alleys, and the totals for the seven months' period ended Aug. 1, 1931.

	During July	To Aug. 1
Roads	9,309,088	89,977,333
Streets	3,061,583	13,887,378
Alleys	98,900	512,890
Total	12,469,571	104,377,601

Electric Rates Reduced to Aid Farmers

The California Oregon Power Co., Medford, Ore., has been authorized by the California Railroad Commission to reduce by 10 per cent the contract rates under which it supplies electric energy to irrigation districts in Siskiyou County, such reduction to remain in effect for the present season or as long as the price of butter fat remains below 35c. per pound at Montague. This reduction results from a voluntary offer by the power company to relieve temporarily the dairymen's depression by assuming a share of the season's losses based on the ratio between the cost of electric service and the total cost of producing butter fat. In determining the extent of this reduction a joint study was conducted on the ground by one of the commission's engineers, the company's division manager and representatives of the several irrigation districts.

Termite Control Studied in California

The Termite Investigations Committee, an organization sponsored by leading California producers and users of lumber, with the cooperation of the University of California has just concluded its three-year survey of termites and of methods of preventing the millions of dollars' annual damage done by them. Complete reports of the committee's findings will be written and filed in the University of California libraries in Berkeley and in Riverside and a summary will be published in book form soon.

The most important conclusions of the committee are as follows: The types of termites found in California are all native to the state. They have always been here and will continue to be here. There is apparently no feasible way of eliminating them completely, or even of reducing their numbers below a point of economic significance. But by the intelligent application of information which this investigation has made available there is little excuse for any extensive damage in either new or old construction. Effective control is essentially a matter of proper building construction methods.

Although all the details of the problem have not been worked out, the groundwork has been laid for effective control. A relatively complete picture of California termite fauna has been obtained, including distribution of species, density of species, economic significance of species, biological factors upon which control measures depend, and chemical control measures.

In a general way, the findings that will be included in the committee's report will be an amplification of the essential facts that have already been put at the disposal of the public in Circular 318 of the University of California college of agriculture, under the title "Termites and Termite Damage."

COSTS AND CONTRACTS

ENR Index Numbers

Cost			Volume		
Aug. 1,	**1931**	**168.38**	**July,**	**1931**	**227**
July 1,	1931	174.37	June,	1931	243
Aug. 1,	1930	200.95	July,	1930	226
Average,	1930	202.85	Average,	1930	260
Average,	1929	207.02	Average,	1929	317
1913	.....	100.00	1913	.....	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Aug. 20, with some comparisons, total as follows:

(In Thousands of Dollars)

	Aug. 20, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$1,847	$2,458	$5,011
Other	23,503	14,164	24,624
Streets and roads	10,889	10,879	12,860
Other construction	16,810	14,119	19,236
Total	$53,049	$41,621	$61,732

Total, all classes, Jan. 1 to Aug. 20:

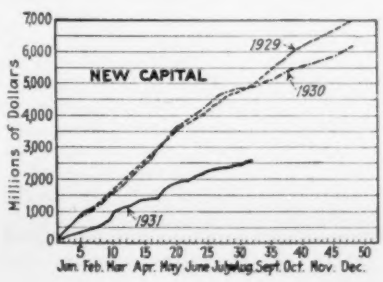
1931	$1,765,028
1930	2,312,434

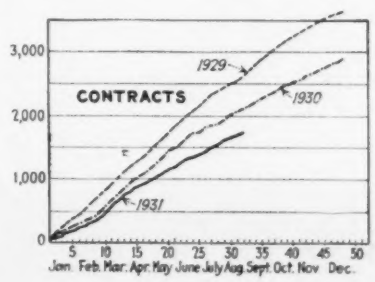
Capital and Contracts

Issues of new capital for the week of Aug. 15 totaled 25 millions—18 private and 7 public. This week's total showed improvement over the 9 millions of the preceding week and is comparable to the weekly average of 25 millions for August, 1930.

Principal issues of the week were: Minneapolis, St. Paul & Sault Ste. Marie Railway 5s, $10,000,000; Greenwich, Conn., 3½s, $650,000, sewer; Greenburgh, N. Y., 4s, $650,000, school.

Cumulatively, new capital issued Jan. 1 to Aug. 15 totaled 2,572 millions, compared with 4,839 millions in the corresponding period of 1930.





Kentucky Completes First Unit of Toll Bridge Program

On Aug. 5 the State of Kentucky officially opened the new cantilever highway toll bridge across the Ohio River at Ashland, the first unit to be completed of an extensive toll bridge construction program authorized by the legislature of 1928. The new structure is of the cantilever type with a main span 739 ft. from center to center of piers and unusually long side spans measuring 431 ft. each. It carries a 22-ft. roadway and one 5-ft. sidewalk. Silicon steel was used in the trusses, the floor system and bracing being of the conventional carbon steel. The J. E. Greiner Co., Baltimore, Md., was designing and constructing engineer.

Building Costs in Portland, Ore.

Paving and sewer costs in Portland, Ore., in the last three years were given on p. 194 of the July 30, 1931, issue in an article entitled "Construction Costs Data in Many Cities, 1929-31." The accompanying tabulation gives some building costs in that city for those years. The average in the five operations listed (not including the common brick price item) is 18 per cent below 1929 and 15 per cent below 1930. Paving and grading costs are about the same as in 1929 and 6 per cent more than in 1930, according to the average unit prices of ten or more winning bids in each of those years. Detailed costs were given in the July 30 issue of 6- to 36-in. vitrified and concrete pipe in place; average costs for 1931 are 4 per cent below 1929 and 1 per cent above the 1930 average.

	Summer of			Per Cent Decrease From	
Building	1929	1930	1931	1929	1930
Earth excavation, cu.yd.	$0.52	$0.50	$0.43	17	14
Common brick, price M.	16.00	14.00	12.00	25	14
Common brick in place, M.	26.00	24.50	22.00	15	10
Concrete, cu.yd.	12.60	11.25	9.25	27	18
Concrete fireproofing, cu.yd.	10.00	10.00	9.00	10	10
Floor forms, sq.ft.	.12½	.12½	.09	20	20
Building	.....	.....	.....	18	15
Grading and paving	.....	.....	.....	0	+6
Vitrified and concrete tile	.....	.....	.....	4	+1
Construction cost	.....	.....	.....	15	11

Wages in Nashville and Topeka

Prevailing and official or union wage rates were given for 32 cities on p. 236 of the Aug. 6, 1931, issue. The average prevailing rate for five trades was 95c. per hour, compared with $1.15 for the official scale, a difference of 17 per cent. Figures are here give for two additional cities, Nashville and Topeka.

	Nashville		Topeka
	Prevailing	Scale	Prevailing and Scale
Carpenters	$0.50	$0.90	$1.00
Bricklayers	1.50	1.50	1.50
Plasterers	1.50	1.50	1.50
Ironworkers	.....	.....	1.00
Common laborers	.25	.....	.40

Brief News

ERECTION of a new gas plant to cost $850,000 will be undertaken at Vancouver, B. C., by the British Columbia Electric Railway Co. Work will start next fall and will continue throughout the winter, completion being required by Nov. 1, 1932.

PLANS to double the present capacity of the lower level pumping station of the Montreal aqueduct are being drafted. This is the last section of the work to be undertaken on the original plans, formed twenty years ago, to give Montreal a 360,000,000-gal. daily pumping plant.

A NEW RESERVOIR with a capacity of 19,000,000 gal. is nearing completion in the colony of Hongkong. The dam for the reservoir is 400 ft. wide and 110 ft. high. Work is being carried out by a Chinese firm, with an American manager.

WOLF RIVER, which deflects around the northern part of Memphis, Tenn., and is contiguous to many industrial sites, will be surveyed to determine the feasibility and cost of extending the present 9-ft. channel five miles beyond its end. The survey has been recommended by the Board of Engineers for Rivers and Harbors.

GRADE CROSSING ELIMINATION along 14th St. in Louisville, Ky., is assured by the signing of a contract between the Pennsylvania Railroad and the city. Part of the cost of $3,000,000 will probably be absorbed by the Illinois Central Railroad, which uses the Pennsylvania tracks along the line of the proposed improvement.

BRIEFS must be filed Sept. 17 with Edward K. Campbell, special master, by the city of New York and the State of New Jersey with regard to the length of time which must elapse before New York can cease dumping garbage off the New Jersey coast.

A STANDARD SAFETY CODE covering permanent and temporary outdoor grandstands and temporary and portable indoor stands for the seating of audiences is now being developed by a committee of the American Standards Association. The code will cover structural stability and strength, exits, fire hazards, sanitary arrangements and methods of erection. Kenneth H. Osborn, secretary of the Osborn Engineering Co., Cleveland, Ohio, is chairman of the committee.

ALABAMA will vote next November on a proposal to issue $25,000,000 in bonds for highway construction and emergency repairs, to be repaid by a 1c. addition to the gasoline tax.

THE INTERESTING SUGGESTION that some portions of the Canadian National Railway lines be taken over and incorporated into the trans-Canada highway was made recently in the Canadian Senate by Senator Rufus Pope. He instanced the three lines from Fort William to Winnipeg, and thought that one could be spared for the national highway. There were also other portions of transcontinental lines, he thought, that could be used for the same purpose.

BIDS for the construction of a new naval airship hangar at Sunnyvale, Calif., will be opened on Sept. 23. Construction of a lighter-than-air base at this point was authorized by the last session of Congress, which appropriated $4,000,000 for buildings and $2,200,000 for other work. The new base will provide Pacific Coast facilities for the naval airship "Akron."

A NATIONAL SAFETY CODE for elevators, dumbwaiters and escalators, developed under the technical direction of the American Society of Mechanical Engineers, the American Institute of Architects and the U. S. Bureau of Standards, has just been approved by the American Standards Association. The code permits the operation of more than one elevator in a single shaft, but rigid safeguards must be provided to eliminate any possibility of collision. It also provides for two-story cars to serve two floors simultaneously from the same shaft.

POSSIBILITIES for a canal connecting the Allegheny River near Oil City, Pa., with Lake Erie are to be studied by engineers retained by the Chamber of Commerce of Erie, Pa.

APPRAISAL of the power plant of the Puget Sound Power & Light Co. that is to be acquired by the city of Puyallup, Wash., has been confirmed by the U. S. Circuit Court of Appeals at San Francisco. The appeal sustained the decision of a lower court in fixing a valuation of $216,825.

The Business Outlook

The quiet drifting of business was rudely shaken by the jolt of crop reports forecasting an enhancement of plentiful poverty. Otherwise the weekly indicators reflect little change in the general dullness. Steel operations appear steady. Building construction has passed the summer peak. Power production has been virtually unchanged for four weeks. Car loadings turned slightly upward. Check payments and currency circulation moved upward in the usual manner for the period.

—The Business Week, Aug. 19.

SOCIETY CALENDAR

AMERICAN ASSOCIATION OF ENGINEERS, Chicago; annual convention, Huntington, W. Va., Sept. 28-30.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Washington; annual meeting, Sept. 28-Oct. 1, Salt Lake City.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York; annual convention, Montreal, Sept. 14-17.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; fall meeting, St. Paul, Minn., Oct. 7-9.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

AMERICAN WELDING SOCIETY, New York City; fall meeting, Sept. 21-25, Boston.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Chicago; conference, Sept. 24-26, New York City.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NATIONAL SAFETY COUNCIL, New York City; twentieth annual safety congress, Chicago, Oct. 12-16.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Sept. 29-Oct. 2, Boston.

Obituary

J. WALTER MORGAN, member of the engineering firm of Charles E. Krebs, Inc., of Charleston, W. Va., died on Aug. 14. He was 60 years old.

HOMER E. NIESZ, electrical engineer and manager of industrial relations, Commonwealth Edison Co., Chicago, died on Aug. 6. Mr. Niesz was president of the Western Society of Engineers in 1925-26.

WILLIAM H. HEALY, president of the Healy-Tibbitts Construction Co., San Francisco, died Aug. 11 at the age of 65. Mr. Healy started his career in the construction business when he entered into the partnership with Robert Tibbitts in 1886.

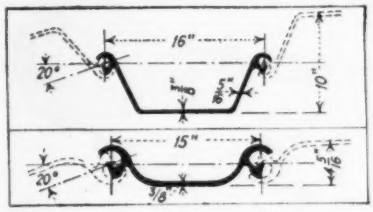
ALBERT REESOR RAYMER, assistant vice-president and chief engineer of the Pittsburgh & Lake Erie R.R., died on Aug. 12 at his home in Beaver, Pa., after a long illness. Mr. Raymer, after his graduation from Toronto University in 1884, was engaged in construction on several railroads and in 1896 became connected with the Pittsburgh & Lake Erie as assistant engineer. In 1920 he was made chief engineer and in 1926 became assistant vice-president. Mr. Raymer was a past-president of the Engineering Society of Western Pennsylvania and a member of the American Society of Civil Engineers.

SAMUEL T. WAGNER, consulting engineer of the Reading R.R., died suddenly last week at his home in Philadelphia at the age of 70 years. Mr. Wagner, after his graduation from the University of Pennsylvania in 1881, was with the Phoenix Iron Co. until 1893 and from 1894 until 1900 was with the bureau of surveys in the city of Philadelphia. In 1902 he went to the Philadelphia & Reading R.R. (now the Reading Company) as engineer in charge of grade-crossing elimination. In 1915 he was appointed chief engineer. He retired from active duty in 1927 but remained with the railroad as consulting engineer. In 1915 Mr. Wagner was awarded the James Laurie prize by the American Society of Civil Engineers.

Construction Equipment and Materials

New Sheetpiling

The addition of a line of steel sheetpiling to its products is announced by the Inland Steel Co., Chicago, Ill. Two sections of the series are already avail-



Sheetpiling sections

able, and others will be added in the near future. Dimensions of these sections are given in the illustration; other data follow:

Section	1A 15-34	1D 16-25
Weight per foot	42.50 lb.	33.32 lb.
Weight per square foot of wall	34.00 lb.	25.00 lb.
Moment of inertia	19.10 in.⁴	49.60 in.⁴
Section modulus per single section	8.42 in.³	13.44 in.³
Section modulus per linear foot of wall	6.74 in.³	10.08 in.³
Radius of gyration	1.23 in.	2.25 in.

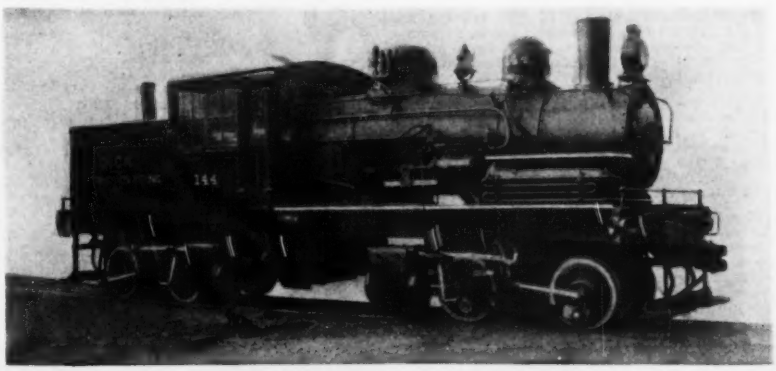
Dual Units Drive New Type of Heavy Steam Locomotive

For hauling heavy loads on steep grades under the handicap of short curves and poorly laid track, the Vulcan Iron Works, Wilkes-Barre, Pa., has developed a new type of duplex locomotive equipped with two swiveling trucks, each a complete driving unit in itself. The locomotive illustrated weighs 55 tons in service order, with the weight properly distributed over eight driving wheels. The arrangement consists of two four-wheel swiveling trucks, each having a pair of driving cylinders and each supplied by steam through flexible connections from the boiler. Driving wheels are 33 in. in diameter; truck wheel base 5 ft.; total wheel base 26 ft. 5 in.; length over bumpers 32 ft. 6 in.

The main locomotive frame, which carries the boiler, cab, tank and upper structure, is of heavy structural steel, tied together with heavy cast-steel bumpers and crossties and provided with standard automatic couplers. The boiler is of the extended wagon top type and gets its water supply from the rear tank by means of a feed pump and an injector. It has a working pressure of 200 lb. per sq.in. The water tank, located over the rear engine truck, holds 1,400 gal., and is equipped with a feed water heater. Space is provided for approximately 5,000 lb. of coal. Other equipment includes Westinghouse air brakes and separate sand boxes to serve each truck. There is also an auxiliary throttle control in the steam line by which both trucks may be operated simultaneously, or the steam to either truck may be partly or completely shut off to prevent slipping of wheels. This operates entirely independent of and does not interfere with the main throttle. Under preliminary tests the locomotive developed a tractive effort of 30,000 lb.

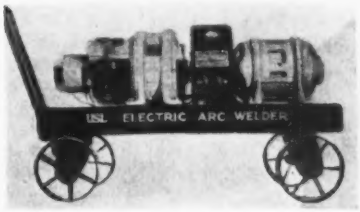
Portable Welder Easily Adjusted

An electric arc welder with no voltage adjustments of any kind, with no switches or rheostats for current adjustment, and with everything eliminated that might confuse the operator and make him think in terms of volts and amperes instead of welding results, has recently been put on the market in 200- and 300-amp. sizes by the arc welder division of USL Battery Corp., Niagara Falls, N. Y. The new welder is termed "Full Range" by its makers because it permits an unlimited number of accurate welding current adjustments. These are made by a simple electrode indicator which is set by the operator for the size electrode being used. The machine is then ready for the welding job.



Steam locomotive designed for rough track

Other advantages claimed for the welder include a high striking voltage of 60 volts, constant for all commercial sizes of electrodes, either bare or coated, and a welding generator specially de-



Portable welding unit

signed to produce an arc which prevents buring on light work and assures deep penetration on heavy work. With small electrodes the welding current is held constant; with large electrodes constant energy is developed at the arc.

Road Pump Designed for Long Life

By assembling a high pressure displacement pump equipped with a pressure control regulator, a suitable gasoline engine, and a wheeled carriage the Domestic Engine & Pump Co.,

High pressure road pump

Shippensburg, Pa., has produced a contractors' road pump unit which complies fully with the new R-80 and R-125 standard specifications of the Associated General Contractors. The R-80 unit has a capacity and guaranteed working pressure range of from 80 g.p.m. at 550 lb. to 100 g.p.m. at 440 lb., this range being obtained by simply changing the engine governor speed setting. At 1,200 r.p.m. motor speed, the pump has a displacement of 80 g.p.m.; at 1,475 r.p.m. of 100 g.p.m. The R-125 unit, while rated at 125 g.p.m. at 320 lb., has an operating range as follows: at 1,200 r.p.m. engine speed, a displacement of 104 g.p.m. at a working pressure of 425 lb.; at 1,440 r.p.m., 125 g.p.m. at 352 lb.

The Domestic model 56 Tripiex Pump is used on both models. This is made of two independent castings, the liquid or cylinder end and the crankcase. Each of the three cylinders is fitted with a removable sleeve with an abrasion-resisting inner surface of nitrided nitralloy. The bronze pistons are fitted with a water seal made of

three hydraulic packing cups. The plunger rods are of rust-proof stainless steel. No packing glands are used in the liquid end of the pump; these appear only at the crankcase section, where they serve solely for oil-retaining duty. Valves and valve seats are of bronze and are so mounted that the outflowing water gives them a slight rotating motion, thus producing a self-grinding effect.

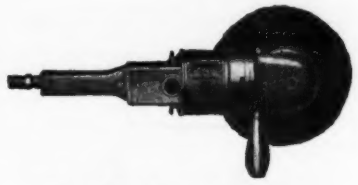
The crankcase unit incloses the crankshaft, crossheads, main drive gears and the oiling system, and also supports the inclosed intermediate high-speed gears and shaft. Ball bearings are used on the latter, while the crankshaft and connecting rod are fitted with bronze backed, babbitt-lined bearings with laminated shims. All gears have machine cut herringbone teeth. Crankshaft, connecting rods and crossheads are automatically lubricated from an oil reservoir in the crankcase. Ball bearings run in grease and are fitted with Alemite connections.

The pressure control regulator is an integral part of the pump. When pressure in the discharge line reaches a predetermined amount, the bypass valve in the regulator is automatically opened so that water discharged from the pump is returned to the inside manifold while pressure is held in the discharge line by a check valve. This relieves the pump of the pressure load and permits both pump and engine to idle until the line pressure drops.

On both the R-80 and the R-125 units the power source is a four-cylinder, heavy duty Waukesha gasoline motor equipped with radiator, friction clutch, high tension magneto, air cleaner and self-lubricated governor. This motor develops from 40 to 46 hp. at speeds of from 1,200 to 1,500 r.p.m.

Light Electric Saw

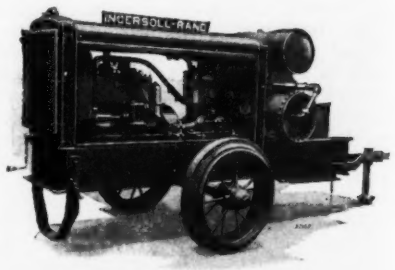
Wood, stone, slate and other building materials can be cut with a new portable electric hand saw announced by the United States Electrical Tool Co., 2490 West Sixth St., Cincinnati, Ohio. This is made in five sizes, the largest of which will make a maximum cut of $4\frac{1}{8}$ in. and weighs only $26\frac{1}{4}$ lb. Two easy adjustments set the saw quickly for any depth and for any angle to 60 deg. A patented beveling device does away with the need for a try-square. A clear vision blower keeps the sawdust away from the markings, assuring even sawing. Top and automatic bottom guards protect the operator in every working position. Ball bearings are used throughout, and a special heat-treated double reduction gear assures long life and maximum power from the universal motor, which will operate on either alternating or direct current at 110, 220 and 250 volts.



Portable electric hand saw

Trailer-Mounted Air Compressor

The speed trailer, a portable air compressor designed for high-speed towing, is a new addition to the products of the Ingersoll-Rand Co., 11 Broadway, New York City. It consists of a standard $5\frac{1}{2}$x5-in. gasoline-engine-driven compressor mounted on two rubber-tired steel wheels. Because of the low center of gravity, this can be towed behind a truck on a good road at 30 to 35 m.p.h. When detached, it can be moved abou. by one man. The steel frame carries a tool box.



Trailer compressor unit

The complete speed trailer is 13 ft. 10 in. long, 6 ft. wide and 5 ft. 9 in. high. It has a piston displacement of 120 cu.ft. per minute and is designed for a working pressure of 100 lb. per sq.in. Removable steel side doors permit inclosing and locking unit when it is not in use. Operating features include a compressor unloader engine speed controller, aftercooler, and plate valves.

New Publications

Air Compressors—A new 16-p. catalog describing the full line of Buhl air compressors and accessories has been issued by the BUHL Co., 407 South Dearborn St., Chicago, Ill.

Centrifugal Pumps—A complete and concise synopsis of the principles of centrifugal pumps written by M. D. Aisenstein, chief engineer of the UNITED IRON WORKS, for use in the Pacific Coast Gas Association Handbook has been reprinted and may be obtained from the company at 580 Second St., Oakland, Calif.

Material Handling—Selection of equipment for elevating and conveying materials is facilitated by a 100-p. catalog published by the FAIRFIELD ENGINEERING Co., Marion, Ohio. Among the units covered are belt conveyors, storage silos, power plant equipment, bucket elevators, V-bucket conveyors, skip hoist installations and railroad equipment.

Pavement Reinforcing—"Reinforced Concrete Pavements" is the title of a 40-p. illustrated booklet published by the WIRE REINFORCEMENT INSTITUTE, National Press Building, Washington, D. C. After presenting arguments for the use of reinforcing in pavements the booklet takes up the design and installation of wire mesh and concludes with a discussion of the properties and specifications of the material.

Excavators and Cranes—Booklets have been issued by the BROWNING CRANE & SHOVEL Co., 16226 Waterloo Road, N. E., Cleveland, Ohio, describing the models E-2 and K-2 excavators, of $\frac{5}{8}$ and $\frac{3}{4}$ cu.yd. capacity respectively, and the Browning truck crane.

Cold-Mixed Pavement — Characteristics, advantages and methods of application of Colas as a paving material are thoroughly discussed in a 34-p. illustrated bulletin which may be obtained from COLAS ROADS INC., Park Square Building, Boston, Mass.

Fences—Advantages of aluminum as a material for woven wire fences are outlined in a booklet "Why Aluminum Fence" issued by the PAGE STEEL & WIRE Co., Bridgeport, Conn. A second publication, "The Border Patrol," is devoted to illustrations of typical fence installations.

Simplified Practice—U. S. BUREAU OF STANDARDS has issued second editions of two simplified practice recommendations: R26-30, covering steel reinforcing bars, and R61-30, clay tiles for floors and walls. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5c. and 10c. each, respectively.

Tall Concrete Buildings—CONCRETE REINFORCING STEEL INSTITUTE, Tribune Tower, Chicago, Ill., has published a 24-p. booklet "Tall Building Economy." Based on the premise that "average savings of between 4 and 7 per cent of the total building construction costs are made through the use of reinforced concrete in preference to structural steel" and that "the savings become 20 to 25 per cent when expressed in terms of skeleton frame costs," the subject of tall concrete buildings is considered. First, there is a discussion of the various factors that bring about the saving. This is supplemented by illustrations of concrete buildings from 17 to 29 stories high and also by a brief history of each of the buildings illustrated, together with pertinent facts regarding its economy over a similar building of structural steel.

Welded Piping—TAYLOR FORGE & PIPE WORKS, P. O. Box 408, Chicago, Ill., has published an 88-p. catalog 31 describing forged welded pipe and containing many data on the various applications of this product. Several pages are devoted to the design and particular adaptations of joints for large-diameter pipe.

Excavators—Every detail of construction of the Koehring model 401 shovel-pull shovel-crane-dragline is fully described and illustrated in a comprehensive 48-p. catalog issued by the NATIONAL EQUIPMENT CORP., Milwaukee, Wis.

Electric Motors—Descriptive data, application data and dimension charts covering seven types of synchronous motors are contained in a 16-p. bulletin 520 of the IDEAL ELECTRIC & MFG. Co., Mansfield, Ohio.

Gas Odorization—A complete and definite description, with prices, of the Papico natural gas odorization system is contained in bulletin 0-2 of the PACIFIC PIPE & SUPPLY Co., 1002 Santa Fe Ave., Los Angeles, Calif.

Motor-Generator Sets—Illustrations showing a large number of installations of Sterling engine-driven generator sets in various types of service are contained in a 24-p. bulletin issued by the STERLING ENGINE Co., Buffalo, N. Y.

Safety Equipment—Bulletins have been issued by the MINE SAFETY APPLIANCES Co., Pittsburgh, Pa., describing the McCaa half-hour oxygen breathing apparatus and M-S-A protective hats and caps.

Tractors—Advantages of the tractor as an auxiliary to the clamshell bucket in unloading ore boats are explained in a folder produced by the CLEVELAND TRACTOR Co., Cleveland, Ohio.

Welding—As an aid in keeping abreast of new developments in welding equipment, JOSEPH T. RYERSON & SON, INC., Chicago, Ill., has issued bulletin W, in which the newer types of welding rod and equipment are illustrated and described. Extensive information on uses is also included.

Derricks—Steel derricks for every requirement, including stiff-leg, guy, self-supporting, tower and railroad platform types, are described in catalog 62 of the AMERICAN HOIST & DERRICK Co., St. Paul, Minn. Illustrations show many installations, both standard and special.

Flexible Couplings—The Davis flexible coupling, a mechanical device using the principle of the ball and socket, is described in an 8-p. bulletin of the PENN MACHINE Co., Johnstown, Pa.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	Project	Cost	Status
Sewers			
Chicago	Sewage pumping station	$1,411,398	Contract
Hamilton (Ont.)	Sewage disposal plant	1,200,000	Proposed
Roads			
South Carolina	Roads and bridges	3,500,000	Bids asked
Railways			
Colorado	Railway	3,500,000	Bids asked
New Jersey and Pennsylvania	Electric line	10,000,000	Proposed
Oklahoma	Track elevation, etc.	1,500,000	Contract
Unclassified			
Texas	Pipe line	1,500,000	Contract
Federal Government			
Hartford (Conn.)	Post office	1,200,000	Bids asked
Albany (N. Y.)	Court house and Customs building	2,500,000	Proposed
Philadelphia	Custom house and Appraisers building	4,000,000	Proposed
Fort Sam, Houston (Tex.)	Quarters	15,000,000	Proposed
Equipment			
New York	Power equipment	1,643,558	Contract
Buildings			
New York	Apartment	1,000,000	Separate contracts
Worcester (Mass.)	Auditorium	1,753,000	Contract
Jamaica (N. Y.)	Court house	1,500,000	Proposed
Los Angeles	University	1,000,000	Bids asked
Waterville (Me.)	College	3,000,000	Proposed
Boston	Latin school	1,000,000	Proposed
San Diego (Calif.)	Museum	1,000,000	Proposed
Trenton (N. J.)	Railroad station	2,000,000	Proposed

WATERWORKS

PROPOSED WORK

Ark., Benton—State Hospital for Nervous Diseases, c/o Arkansas Constr. Comn., T. Davis, DeWitt, secy., preliminary plans rein.-con., brick pumping station, complete pumping equipment on Saline River. Lund. Eng. Co., Southern Bldg., Little Rock, engr.

Calif., Agnew — State Dpt. P. Wks., Public Wks. Bldg., Sacramento, plans 100,000 gal. steel water tank for State Hospital.

Calif., Arbuckle—District to be formed, surveys water supply for 26,000 acres, taking water from Sycamore Slough by gravity and 3 lifts. $720,000. F. H. Tibbetts, Alaska Commercial Bldg., San Francisco, engr.

Calif., Long Beach—For 22 m.g. reservoir. $275,000 or more. City Eng. Dpt., engrs.

Calif., Sacramento—City Council, sedimentation beds for filtration plant, incl. 7,300 cu.yd. rein.-con. F. J. Klaus, city engr.

Ind., Milan—Waterworks, plant, new mains. $15,000

Ind., Pendleton—Pendleton Water Co., new waterworks, incl. deep wells, mains, fire hydrants. $50,000.

Mass., Cambridge—Filter plant, 6 rein.-con. rapid sand filter beds, new pumping station, 12 m.g.p.d. $100,000. **Maturity late September.** Fuller & Everett, 25 West 43rd St., New York, engrs.

Minn., Minneapolis—City second supply watermain under Mississippi River from Fridley Station. $96,000. If finally authorized work will probably be done by day labor. N. W. Elsberg, city engr.

Mo., Grandview — South Jackson County Water Co., 501 Knickerbocker Pl., Kansas City, preliminary plans water system, incl. 250,000 gal. storage tank, distribution system, etc. $150,000. C. A. Haskins, 822 Finance Bldg., Kansas City, engr.

Mo., Huntsville — Defeated $35,000, waterworks, distribution system improvements. E. T. Archer & Co., 609 New England Bldg., Kansas City, engrs. Noted July 29 Daily.

Okla., Oklahoma City — City Council, preliminary plans main extensions. $100,000. L. M. Bush, City Hall, engr.

Okla., Pryor—Preliminary plans purification plant, main extensions, also power plant. $100,000. V. V. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

Pa., Towanda—Towanda Water Co. dam. $50,000. Engineer not appointed.

Tex., Gladewater—J. G. Pundt, 2104 Forest Park Blvd., granted franchise waterworks and sewerage system, well, pump house, sewer mains, service pumps. F. J. Zuben, 802 Fair Bldg., Fort Worth, engr. Noted July 9.

Ont., Hamilton—City, 6 in. and up c.i. means in various streets as an unemployment relief measure. $100,000. W. L. McFaul, City Hall, engr.

BIDS ASKED

Colo., Denver—Bd. Water Comrs., City and Denver Co. W. H. Leonard, pres., bids about Sept. 15, water conduit, known as Reconstructed Portion Conduit 3; adv. E. N.-R. Aug. 20.

Ind., Peru—Sept. 8, by Common Council, at office H. E. Worl, city clk., iron removal and filtration plant. C. Brossman, 1010 Chamber of Commerce Bldg., Indianapolis, consult. engr.; adv. E. N.-R. Aug. 20. Noted Apr. 23.

Mass., Boston—Aug. 25, by Metropolitan Dist. Water Supply Comn., grading and appurtenances at top of Shaft 4 of Wachusett-Coldbrook Tunnel, granite random ashlar walls in Rutland. F. E. Winsor, Metropolitan Dist. Water Supply Comn., engr.

N. Y., Bedford Hills—Sept. 15, at office Dpt. Correction, W. N. Thayer, Jr., comr., State Office Bldg., Albany, water supply, sewers, water lines at New York State Reformatory for Women; adv. E. N.-R. Aug. 20.

N. Y., Brooklyn—Aug. 25, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Shell Rd., Kings Highway, Triton, 6th, 12th and 24th Aves., Bay 19th, East 29th, East 45th, Dean, McKibben, Mill, North 1st, North 5th and North 9th Sts.

N. Y., New York—Aug. 25, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., steel and c.i. mains in Park Ave., East 80th and Chambers Sts.

N. Y., New York—Aug. 25, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Cannon and Lakewood Pls., Park, Amundson, Holland, Morgan, Mount Eden, Shakespeare and Van Nest Aves., Drake, Jennings, East 161st, East 170th, East 172nd, East 176th, East 231st, West 170th, East 80th and Chamber Sts., Bronx Boro.

Pa., Jamestown—Sept. 1 (extended date), by State Water Power & Resource Bd. of Harrisburg, Pymatuning Reservoir Dam to form lake 16.5 mi. long, 2 mi. wide, 8,365,000,000 cu.ft. capacity, 370,000 cu.yd. embankment, 180,000 cu.yd. excav., 9,000 cu.yd. riprap, 5,000 cu.yd. concrete, 4,000 cu.yd. stone paving, 900 tons steel. $1,500,000 Noted Aug 13.

CONTRACTS AWARDED

Calif., Santa Cruz—Installing wells, not less than 3 m.g. guaranteed flow per day, in connection with water system, to Roscoe Moss Co., 4360 Worth St., $18,000.

Calif., Vallejo—City Council, main extensions, to W. J. Tobin, 527 Balfour St., Oakland, $10,799. Noted Jan. 8.

Ia., Ames — A. B. Maxwell, city clerk, 3 m.g.p.d. water softening plant, general construction, to Ben Cole & Son, Ames, $14,887, to Harding Co., York, Pa., $4,100; filters, to International Filter Co., 59 East Van Buren St., Chicago, Ill., $5,691. Grand total $24,678. Noted July 23.

Me., Hallowell — Water Dist. Comn., steel standpipe, concrete found., to Chicago Bridge & Iron Wks., 250 Stuart St., Boston, Mass. Est. $15,000.

Mass., Rockport — Town, Special Com. on Water Supply, steel standpipe for Pigeon Hill, to Petroleum Iron Wks. Inc., 25 West 43rd St., New York, $6,000. Noted July 16.

Mass., Southampton—See "Materials."

Mass., Waltham — City, standpipe for high pressure water system, to Pittsburgh-Des Moines Steel Co., 270 Bway., New York, $11,300. Total est. $35,000.

Mass., Weston—Town and Metcalf & Eddy, engrs., Statler Bldg., Boston, mains to Anthony Ross & Son, 97 Bedford St., Lexington, $5,424, found., to J. H. McCuskor & Co., 62 Church St., Waltham, $4,000; standpipe, to Chicago Bridge & Iron Wks., 250 Stuart St., Boston, $11,500. Est. $15,000. Noted July 30.

Mich., Ann Arbor—H. H. Caswell, mgr. City Water Dpt., 6 m.g. rein.-con. reservoir, to Bryant Detwiler Co., 2806 Union Guardian Bldg., Detroit, $108,248. Noted July 23.

Mo., St. Louis—City Water Dpt., one 400 kw. d.c. and one 200 kw. a.c. direct connected steam engine driven generator at Sanitarium Power House of St. Louis Waterworks, to Matton Engine Wks., Mattoon, Ill., $26,883.

O., Cleveland—Cuyahoga Co., main in West Merkle Ave., West 54th St. and Ridgewood Ave., Impvt. 199, to Sewer Constr. Co., 2126 Althen Ave., $47,944. Noted July 9.

Tex., Dallas—Preston Road Fresh Water Dist., I. P. DeLoache, chn., mains, appurtenance, pump house, pumping equipment, tank and tower, to Dallas Constr. Co., 3106 Commerce St., $102,770. Est. $175,000. Noted July 30.

Wis., Milwaukee—City, D. M. McKeith, comr., mains in South 1st St., to H. Hohensee, 431 Ludington Ave., Wauwatosa, $14,031.

Ont., Toronto — Public Utility Com., 1666 Kingston Rd., pumping station addition in Scarboro Twp., incl. pumphouse addition, to L. H. Walton, 14 Gates Ave.; two 1,500 g.p.m. pumps, one with motor and one with gasoline engine to Turbine Equipment Co. Ltd., 73 King St. W. Est. $25,000. Noted Dec. 18.

Kan., Olathe—City Council, earth dam for impounding reservoir, to Thomas & Schooley, 2503 North 12th St., Kansas City, $26,250.

See proposal advertising on page 75

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LEADITE

Trade Mark Registered U.S.Pat.Office

Laying 48 in. bell and spigot pipe beneath paved street.

Laying 60 in. bell and spigot pipe across marshland.

Supplying Water to Millions of People Depends upon Good Pipe — — — *and upon Good, Permanently Tight Joints* — — —

That LEADITE does make good, permanently tight and durable joints on bell and spigot water mains, is attested to by the fact that it has been widely used for over a quarter century—that in many cases, it is the "standard for comparison."

Thousands of miles of bell and spigot water mains are satisfactorily jointed with LEADITE. It is the oldest established, most frequently discussed, and most widely used self-caulking jointing material for bell and spigot pipe.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
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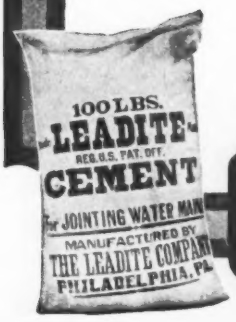

THE LEADITE COMPANY
Land Title Building - - - Philadelphia, Pa.

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SEWERS

PROPOSED WORK

Calif., Benicia—City Council plans 0.5 mi. 6 and 8 in. vitr. pipe sewer in L and M Sts., et al. E. A. Eager, Courthouse, Fairfield, engr.

Calif., Los Angeles—Bd. P. Wks., City Hall, soon takes bids sewers in Vineland Ave. and Valley Spring Lane Sewer Dist., incl. 191 lin.ft. 10 in. c.i. pipe, 71,831 lin.ft. 8- to 27-in. vitr. pipe, 7,021 lin.ft. 8- to 27-in. rein.-con. pipe, 271 lin.ft. tunnel (8, 10 and 27 in. pipe), 428 lin.ft. 6 in. chimney pipe, 170 manholes, 37 junction chambers, 62 flushing structures, 6 lampholes, 185,070 sq.ft. resurfacing. $156,000. J. L. Moyer, City Hall, ch. estimating engr. Noted Aug. 31.

Calif., Modesto—City Council plans sanitary sewerage system, $40,000. F. J. Rossi, city engr.

Calif., San Francisco—City Council plans 450 ft. 5 ft. circular rein.-con. sewer, 13,000 ft. wood piles in Ingals St. between Mancroft and Yosemite Aves. M. M. O'Shaughnessy, city engr.

Conn., Fairfield—McKesson & Robbins, Inc., Grasmere Ave., plans sewage disposal plant. $25,000. N. Hill, Westport, engr.

Conn., Milford—Town, plans sewage disposal plant. Est. exceed $25,000. V. B. Clark, Capitol Bldg., Ansonia, engr.

Ill., Harrisburg—City Council sewerage system, disposal plant, additional work. $300,000—$400,000. Russell & Axon, 6200 Easton Ave., St. Louis, and McDaniel Bldg., Springfield, Mo., engrs.

Ill., Ottawa—Bd. Local Impvts., sewers. $75,000.

Minn., Worthington—Sewage disposal plant. Imhoff tanks, sludge bed, $50,000. W. E. Buell & Co., 501 Insurance Exch. Bldg., Sioux City, Ia., engrs.

N. J., Hasbrouck Heights — Boro Council, Municipal Bldg., general contract altering sewage disposal plant. $25,000 or more. **Maturity probably in October.** Watson, Landall & Rudolph, c/o owner, engrs. Noted May 28.

N. J., Keansburg—Mayor and City Council, improving sewerage system. $100,000.

N. J., Long Branch — Long Branch Sewage Disposal Co., sewage disposal works. $150,000. Project indefinitely in abeyance. Clyde Potts 30 Church St., New York, engr. Noted July 7.

Okla., Oklahoma City—City Council Virginia Ave. Sanitary Relief Sewer, incl. 13,600 ft. 24- to 48-in. rein.-con. and vitr. clay pipe. $70,000. L. M. Bush, city engr.

Okla., Oklahoma City — Preliminary plans Northwest Sanitary Main Sewer. $60,000. L. M. Bush, City Hall, engr.

S. D., Rapid City—Trunk line sewers, sewage disposal plant. $190,000. J. P. Sodestrom, city engr.

Tex., Dallas—Rejected bids sanitary sewers in Clifton Pl. J. B. Winder, Dallas, engr.

Tex., Ozona — Preliminary plans sanitary sewerage system, incl. main lines, small disposal plant. $40,000. Engineer, c/o Ozona Lions Club, Ozona, engr

Ont., Hamilton — City Council, rein.con. activated sludge type sewage disposal plant, Plymouth St. $1,200,000. W. L. McFaul, City Hall, engr.

Ont., Owen Sound—City, 2 mi. 8 in. and up vitr. tile sewers in 11th St. W., 3rd Ave. E and 5th Ave. E. $25,000. R. McLean, City Hall, engr.

BIDS ASKED

Ill., Chicago—Sept. 10, by J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., West Side Intercepting Sewer, Contr. 4; adv. E. N.-R. Aug. 20.

Mo., St. Louis—Sept. 1, by Bd. Pub. Serv., 208 City Hall, Wherry Avenue Public Outlet Sewer, 690 ft. in open channel, 1,640 ft. 19-ft., 130-ft. 16 ft., and 24 ft. 12 ft. in enclosed section. $151,000. Noted July 23.

Mo., St. Louis—Sept. 8, by Bd. P. Serv., City Hall, dredging 1,900 ft. excavating open channel from Mississippi River to waterworks conduit right-of-way and Maline Creek, Sect. A-1, Maline Creek Sewer. $61,000. W. W. Horner, city engr.

N. J., Fanwood—Sept. 2, by Boro Council, Fanwood Hall, Watson Rd., vitr. stone and c.i. sewers. Bauer, Kling & Coudert, 120 Broad St., Elizabeth, boro engrs.; adv. E. N.-R. Aug. 20.

N. J., Somerville—Bd. Boro Council, Boro Hall, bids about Sept. 1, 1 story, rein.-con. sewage disposal plant. $25,000 or more. Remington, Vosburg & Clark, 509 Cooper St., engr. Noted July 30.

N. Y., Dannemora—Sept. 1, by Dpt. Correction, W. N. Thayer, Jr., comr., State Office Bldg., Albany, sewers, waterlines, additional water supply at Clinton Prison and Dannemora State Hospital; adv. E. N.-R. Aug. 20.

N. Y., Greenburgh—Sept. 4, by Westchester Co. Sanitary Sewer Comn., Court House Annex, White Plains, Sect. J, Sawmill Project, incl. 1.33 mi. 66 in. rein.-con. or c.i. sewer.

O., Cleveland—Aug. 21, by City, sewer line in Nine Mile Creek from East 152nd St. to St. Clair Ave. To exceed $50,000. R. Hoffmann, City Hall, engr.

Tex., Mineola—Aug. 28, by City, L. D. Calloway, city secy., improving sanitary sewerage system, disposal works, incl. settling tank, pump station, dosing tank, filter, 12,000 ft. 6 and 8 in. vitr. clay pipe. Montgomery & Ward, Wichita Falls, consult. engrs.

CONTRACTS AWARDED

Calif., Huntington Park—See "Streets and Roads."

Calif., Los Angeles—Bd. P. Wks., City Hall, Sect. 1 San Pedro Intercepting Sewer, incl. 4,950 ft. 20 in. c.i. pipe, 326 ft. vitr. pipe, to L. R. Weber, 603 20th St., Santa Monica, $49,696.

Ill., Chicago—J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., complete pumping station, 126th St. and Cottage Grove Ave., at Calumet City, to John Griffiths & Son Co., 228 North La Salle St., $1,411,398. Noted July 23.

Ind., Bloomington—City Council, Jordan River Storm Sewer, concrete pipe, to Kerr & Murphy, Bloomington, $44,168. Noted July 2.

Ind., Chesterton—Town Bd., West and North Side Sewers, to Sunderman Constr. Co., Gary, $26,383.

Ind., Danville—Town Bd., new sewerage system, to J. R. Palmer, Danville, $55,664. Noted July 23.

Ia., Greenfield—C. L. Downing, town clk., sewers, to Teget Constr. Co., Webster City; sewage disposal plant, to Wickham Bridge & Pipe Co., Council Bluffs. Noted July 9.

Kan., McPherson—City, c/o D. R. Malty, mayor, sewage disposal plant, main sewer, driveways, to W. B. Carter, 7 North Rockford St., Tulsa, Okla., $63,925. Noted July 2.

Mass., Walpole—Bd. Sewer Comrs., Town Hall, 16,000 ft. sewer along Neponset River, to DeCristofer Bros. Co., 38 Glendower Rd., Roslindale, $107,937. Noted Aug. 6.

N. J., Clifton—Bd. City Council, City Hall, storm water drain in Athenia Sect., est. $25,000, to P. Guiliani, 447 North Main St., Lodi, $24,000.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in 101st St., to S. Guerriero, 1024 66th St., $1,915; in East 46th St., to E. Meluccio, 1209 61st St., $1,445. Noted July 16.

N. C., Roxboro—Mayor and Commissioners, vitr. clay outfall sewer, to Elliott Bldg. Co., Hickory, $7,654.

O., Columbus—Comrs. Franklin Co., F. D. Connally, clk., sewers in Sewer Dist. Truro 1 and 2, to Jack Conie, 717 Campbell St., $15,706 and $22,364 respectively. Noted July 29.

O., East Liverpool—City, extending sanitary sewer system in Oakland Dist., to Peter Milliron Co., East Liverpool, $31,371.

O., Vermillion—Village Council and Bd. Pub. Affairs, sewers and water lines, to Northland Constr. Co., Toledo, $20,246.

Ore., Klamath Falls—City Comn., 30,000 ft. 8 and 10 in. sewer in 16th Sewer Dist., to Dunn & Baker, Klamath Falls, $32,229.

Wis., Hartford—Sewage disposal plant addition, to J. Thorn, Hartford, $31,825.

Wis., Milwaukee — City Council, to C. E. Stormowski, 1874 North Warren St., sewer mains in South Water and East Oregon Sts., $351, North 74th St. $192, North 76th St., $426, South Chase St. $761; to J. Forrestal, 2912 West Juneau St., in North 40th St. $587; to Zimmerman & Zimmerman, 2726 State St., in North 79th St. $878, West Blue Bound Rd. $611, West Fairmont Ave. $2,121; to Clayton Constr. Co., Port Washington Rd. and Gruber Ave., in West Center St. $22,585; to P. D. Johnson, 729 29th St., in West Fairmount Ave. $732. Grand total $29,517.

Wis., Whitefish—Village Bd., storm sewers in North Lake Dr., South Village limits to East Silver Springs, to Clayton Constr. Co., 356 East Oklahoma Ave., Milwaukee, $46,819. Noted July 31.

WASTE DISPOSAL

PROPOSED WORK

Ont., Ottawa — Soon takes bids concrete, brick, steel incinerator with 2 units, 50 tons per day capacity, Bayview Rd. $100,000. F. C. Askwith, City Hall, engr. Noted Jan 29.

BRIDGES

PROPOSED WORK

Conn., Vernon—Town, F. J. Prichard, Town Hall, repairing, rebuilding bridge. $40,000.

Mass., Quincy—City, Dpt. P. Wks., concrete bridge, Beale St. $25,000 or more. W. S. Carson, City Hall, engr.

Kan., Kansas City—City Council, City Pub. Service Co., Chicago, Rock Island & Pacific R.R. Co., La Salle Street Station, Chicago, Ill., W. H. Peterson, ch. engr. and Kansas City Terminal Ry. Co., Union Station, Kansas City, Mo., J. V. Hanna, ch. engr., plans rebuilding 2 viaducts, concrete. $62,500. Ash, Howard, Needles & Tammen, 1012 Baltimore Ave., Kansas City, Mo., engrs.

N. J., New Brunswick—Bd. Chosen Freeholders Middlesex Co., Court House, plans Bridge 314 at Shepard Ave., Bridge 321 Texas Ave., Bridge 325 Orchard St., Bridge 183, Old Englishtown Rd., Bridge 134 Milltown Rd., Bridge 319 Lake St., Bridge 320 Lake Ave., Bridge 317 Deans Fish Pond Rd., Bridge 322 Barron Ave., Bridge 318 Blazer Rd. $25,000 or more. W. F. Buchanan, 280 Hobart St., Perth Amboy, engr.

Okla., Arapahoe—Bd. Comrs. Custer Co. rejected bids thirty 100 ft. river truss and two 40 ft. span I-beam bridge, 20 ft. roadway over South Canadian River—four 40 ft. span I-beam bridge, 20 ft. roadway over Beaver Creek—three 32 ft. span I-beam bridge, 20 ft roadway over East Barnitz Creek—three 30 ft. span I-beam bridge, 20 ft. roadway over West Barnitz Creek—one 100 ft. and one 30 ft. span I-beam bridge, 20 ft. roadway over Washita River in Butler-Hammond Section—one 100 ft. span truss bridge, 20 ft. roadway over Washita River in Butler-Leedy Section. J. Hatchett, clk.

Wash., Seattle—Temporary bridge for street car and vehicular traffic over Lake Union while present University Ave. bridge is being reconstructed and permanent approaches built. $50,000. W. G. Morris, city engr.

BIDS ASKED

Illinois—Aug. 24, by State Dpt. P. Wks. & Buildings, Div. Hys. Springfield, 25 ft. rein.con slab bridge, Route 20, Sect. GR-B, Lake Co.—25 ft. rein.-con. slab bridge, Route 22, Sect. 23-RB—thirteen 33 ft. span rein.-con. girder bridge, retaining wall, Route 49, Sect. 144-H, both Cook Co.—raising, widening six 14 ft. and one 21 ft span timber bridge, Route 78, Sect. 109-V-B, Carroll Co.— 33 ft. and two 37 ft. span rein.-con. girder bridge, Route 95, Sect. 122-V-B Fulton Co.—one 45 ft., one 50 ft. and two 35 ft. span rein.-con. girder bridge, 2 rein.-con substructures, 12 ft. rein.-con. box culvert, Route 143, Sect. 105-B—one 150 ft. and one 100 ft. span steel superstructures, Route 143, Sect. 105-C, both Saline Co.—rein.-con. substructure, fifteen 43 ft. I-beam approach spans on concrete piles, Route 148, Sect. 120-B—100 ft steel superstructure, Route 148, Sect. 120-C, both Jefferson Co.—three 50 ft. span rein.-con. substructure, 5 rein.-con. girder approach spans, two 30 ft. span concrete substructure, two 30 ft. rein.-con. girder approach spans, Route 150, Sect. 133-B—one 115 ft. and one 80 ft. steel superstructures, Route 150, Sect. 133-C, both Alexander Co. F. T Sheets, ch. engr. Noted Aug. 6.

Illinois—Sept. 1 (extended date), by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield—seven 60 ft. spans rein.-con girder bridge, Route 9, Sect. 48-B, Dist. 4, Peoria Co.—two 40 ft. spans rein.-con. girder bridge, Route 71, Sect. 115-B, Dist. 2, Lee Co.—raising and widening one 21 ft. and six 14 ft. spans bridge, Route 78, Sect. 109-VB, Dist. 2, Carroll Co.—two 40 ft. spans rein.-con. girder bridge, six 32 ft., three 20 ft. and two 20 ft. spans rein.-con. slab bridges, also 3 rein.-con. box culverts, Route 89-C, Sect. 105-B, Dist. 3, Marshall and Putnam Counties—one 33 ft., two 37 ft. spans rein.-con. girder bridge, Route 95, Sect. 122-VB, Dist. 4, McDonough Co.—three 45 ft. spans rein.-con. girder bridge, Route 100, Sect. 123-B, Dist. 8, Pike Co.—one 50 ft. and three 30 ft. spans rein.-con. girder bridges, Route 100, Sect. 124-B, Dist. 8, Calhoun Co.—80 ft. steel superstructure on rein.-con. substructure, Route 104, Sects. 141-B and C.—45 ft. rein.-con. girder bridge, Route 124, Sect. 101-B—two 43 ft. spans and twelve 43 ft. spans with eleven 43 ft. I-beam approach spans I-beam bridges on concrete piles, Route 124, Sect. 102-B—200 ft. steel superstructure, Route 124, Sect. 102-C, all Dist. 6, Sangamon Co.—five 20 ft. spans steel I-beam bridge on creosoted piles and 50 ft. rein.-con. girder bridge, Route 146, Sect. 104-B—120 ft. steel superstructure, Route 146, Sect. 104-C, both Dist. 9, Union Co.—repairing and widening seven 15 ft. spans timber bridge, Route 146, Sect. 111-VB, Dist. 9, Johnson Co.—fifteen 43 ft. steel I-beam approach spans on concrete piles, rein.-con. substructure, Route 148, Sect. 120-B—100 ft. steel superstructure, Route 148, Sect. 120-C, Dist. 7, Jefferson Co.—fifty 20 ft. spans steel I-beam bridge on creosoted piles, graveling approaches, Route 150, Sect. 136-B-1, Alexander Co. F. T. Sheets, hy. engr. Noted Aug. 6.

Ia., Atlantic—Sept. 1, at office Auditor Cass Co., two 32 x 20 ft. I-beam bridges, one 80 x 20 ft. pony truss bridge, two 24 x 20 ft., span I-beam bridge, one 70 x 20 ft. pony truss bridge, 140 x 20 ft. high truss bridge, 122 x 16 ft. high truss bridge, all on treated piling, also repairing 122 x 16 ft. high truss bridge. Address County Engineer or Auditor.

Md., Baltimore—Sept. 2, by Bd. Awards at office City Register, City Hall, Lafayette Ave. Bridge over Pennsylvania R.R. N. L. Smith, hys. engr.; adv. E. N.-R. Aug. 20.

Md., Baltimore—Sept. 2, by Bd. Awards, 560 ft. rein.-con., steel bridge over Pennsylvania R.R. on Lafayette Ave. $135,000. N. L. Smith, Municipal Bdg., hys. engr.

Mass., Quincy—New York, New Haven & Hartford R.R. Co., New Haven, Conn., E. E. Oviatt, ch. engr., taking bids rein.-con., steel bridge over railroad, at Saville St. A. S. Tuttle, South Sts., Boston, engr.

Missouri—Aug. 28, by State Hy. Dpt., Jefferson City, bridges in Nodaway, Texas, Stone, Monroe, Ralls, Henry, Jefferson, Wright, Scott, Ozark, Douglas and Miller counties.

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Bridges (Continued)

New Jersey—Aug. 31, by State Hy. Comn., Trenton, furnishing, erecting structural steel, Route 25, Connecting Link, Sects. 7, 7A, and 8, Contr. 54, Newark, Essex Co. A. L. Grover, ch. clk.; adv. E. N.-R. Aug. 20.

Pennsylvania—See "Streets and Roads."

West Virginia — See "Streets and Roads" under "Charleston."

Wisconsin—Aug. 27, by State Hy. Comn. and Manitowoc Co. Hy. Com., Green Bay, 22nd St. Bridge, S.T.H. 17, S.A.P. 3343.

CONTRACTS AWARDED

Calif., Napa—H. H. Thompson, city clk., concrete bridge over Napa River at 3rd St., incl. 10,000 lin.ft. Douglas fur piles, rest piles, 191,000 lb. reinforcing steel, to J. P. Brennan, Redding, $57,494.

Indiana—State Hy. Comn., Indianapolis, two 25 ft. rein.-con. arch bridges, one over Wolf Creek, other over Salt Creek, 24 ft. rein.-con. girder bridge over Hall Creek, Contr. 424, Porter Co., to Rieth-Reilly Constr. Co., Goshen, $21,794 est. $29,887—30 ft. rein.-con. arch and 24 ft. rein.-con. girder bridges, Contr. 428, Ripley Co., to Dryden Bros., Wirt, $7,231 est. $10,760—96 ft. steel truss bridge, Contr. 430, Putnam Co., to R. L. Schutt, 5818 East New York St., Indianapolis, $16,845 est. $21,359. Grand total $45,870. Noted July 2.

Indiana—State Hy. Comn., Indianapolis, 48 span steel truss bridge over Owl Creek, Putnam Co. and 84 ft. steel truss bridge over Offield Creek, Montgomery Co., to P. P. Olinger, Huntingburg, Sandborn, $24,113; 24 ft. rein.-con. girder bridge over Drain ditch, 40 ft. rein.-con. arch bridge over Rattle Snake Creek, and 30 ft. rein.-con. arch bridge under Fill, Montgomery Co., to E. R. Campbell, Sandborn, $24,513.

Iowa—State Hy. Comn., Ames, 49 culverts, extensions, Dubuque Co., to W. A. Burton, Waterloo, $28,200—70 x 20 ft. pony truss bridge with two 32 x 20 ft. I-beam approaches, to A. Olson Constr. Co., Waterloo, $10,518—30 ft. rein.-con. arch bridge, to Jensen Constr. Co., Kimballton, $6,500—two 150 x 20 ft. high truss spans with seven 40 x 20 ft. approach spans, to Ben Cole & Son, Ames, $37,927, all foregoing in Keokuk Co.—60 x 20 ft. pony truss bridge, to W. Denny, West Liberty, $7,140—30 ft. rein.-con. arch bridge, to A. Emmert, Grinnell, $8,200, both Lee Co.—3 I-beam bridges, raising 20 x 16 ft. slab bridge, Page and Fremont Counties, to Wickham Bridge & Pipe Co., 1905 Bway., Council Bluffs, $23,400—80 x 24 ft. plate girder bridge, Polk Co., to E. A. Kramme Co., Des Moines, $9,531—40 x 24 ft. I-beam bridge, Pottawattamie Co., to C. W. Akin, Atlantic, $3,480—28 x 24 ft. I-beam and 70 x 20 ft. pony truss bridges, to J. L. Whitney, Mt. Pleasant, $10,217—15 box culverts, Van Buren Co., to Robertson Co., Muscatine, $6,538. Grand total $151,651.

Ia., Atlantic—Bd. Comrs. Cass Co., 12 culverts, to C. W. Akin, Atlantic, $10,770; one I-beam and 1 pony truss bridge, to Jensen Constr. Co., Kimballton, $15,012.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, single leaf bascule bridge, together with bascule pier, approach span, etc., Contr. Wc-69-17, Worcester Co., to J. S. Bowers, Whiteville, N. C., $100,969, altering substructure, etc., bridge over Potomac River at Kitzmiller, Contr. G-74-611, Garrett Co., to B. H. Shaib, Elkins, W. Va., $3,059. Noted July 23 and Aug. 6.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., single 8 ft. span slab bridge, Contr. CI-99-511, Carroll Co., to Fredericksburg Bridge Co., Fredericksburg, Va., $3,905—altering bridge over Naticoke River at Sharptown, Contr. WI-61-17, Wicomico Co., to Smith Bros., Galesville, $13,970. Noted July 30.

Md., Baltimore—Bd. Awards, construction Hoffmanville Bridge over Gunpowder River and box culvert Locust Bottom Branch, to Forbes-Murphy Contg. Co., 326 St. Paul St., $49,883.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., rebuilding concrete and steel bridge over New York, New Haven & Hartford R.R., Shawmut Ave., to Coleman Bros., Inc., 245 State St., $43,225. Noted July 23.

Missouri—State Hy. Dpt., Jefferson City, to A. A. Davis, Inc., Oklahoma City, Oklahoma, bridge over Sac River, $39,245; over Boyles Branch, $3,604; over branch $1,926, all foregoing St. Clair Co.—to H. C. Botsford, Kansas City, over East Locust Creek, $16,359; over West Locust Creek, $16,298; over Chicago, Milwaukee & St. Paul R.R., $30,281; over Big Medicine Creek, $15,403; over Tanyard Branch, $4,248; over Hulan Branch, $3,888; over Elm Branch, $7,598; all foregoing Putnam Co.—to Bertman & Menefee, Sedalia, over Dry Wash, $1,997; over Dry Wash, $1,673; over Pike Creek $9,231; all foregoing Shannon Co.—to L. W. Hayes Constr. Co., Bethany, over Bear Creek, $9,337; over Marshall Creek, $10,055; over Bear Creek, $6,754; over Brush Creek, $3,312, all foregoing Henry Co.—to F. T. O'Dell, Hannibal, over Marble Creek, Iron Co., $1,184; over branch, Stone Co., $1,004—to Whipple & Irwin, Springfield, over Mineral Branch, Moniteau Co. $3,849—to Knox & Penzel, Jackson, over Apple

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Creek, Cape Girardeau Co., $13,289—to G. Knudson, 3520 Main St., Kansas City, over Fabius Creek, Schuyler Co. $6,619—to Frazier Davis Constr. Co., St. Louis, over Meramec River, St. Louis Co., $122,662 — to H. H. Carrothers, Kansas City, over White River, Taney Co., $137,005—to C. F. Johnson & Sons, Buffalo, over Roak Creek, Taney Co. $38,140. Grand total $504,961. Noted July 30.

Mo., Keytesville—Chariton Co., Court House, bridges, culverts, to Pan-American Bridge Corp., Moberly, $30,175; to Missouri Pure Iron Co., Moberly, $5,500; to W. C. Robertson, Brunswick, $2,999, to F. P. Prather, Hamden, $1,627. Grand total $40,301.

Mo., St. Louis—St. Louis-San Francisco Ry. Co., F. G. Jonah, ch. engr., Frisco Bldg., superstructure 60 ft. rein.-con., steel bridge, 4 tracks wide, 16 ft. clearance, concrete slab deck, to R. J. Reid, 2109 North 14th St., Birmingham, Ala. Owner will lay tracks, own forces. $85,000. Noted June 25.

Neb., Center—Knox Co., bridges, to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, $30,000.

N. J., Paterson—Bd. Freeholders Passaic Co., Court House, steel, concrete bridge over Passaic River, to F. W. Schwiers Co., 90 West St., New York, N. Y., $186,236. Est. $300,000. Noted July 23.

Ohio—O. W. Merrell, dir. hys., Columbus, steel girder bridge over Mill Creek on Sect. "E" Lisbon-East Palestine Rd., Columbiana Co., to J. L. Fondriest, Canton, $13,859. Noted July 16.

Okla., Tulsa—City Council, 2 span 178 ft. rein.-con. underpass at 4th St., to H. L. Cannady & Co., 1116 South Lewis St., $24,855. Est. $27,000. Noted June 4.

R. I., East Providence (br. Providence)—State Bd. P. Roads, State House, Providence, Rumford R.R. Bridge, concrete, steel, to Central Eng. & Constr. Co., 210 Main St., Pawtucket, $17,745. Est. $25,000.

Texas—State Hy. Dpt., Austin, bridges in Caldwell and Cattle Counties, to L. M. Mackey, 325 Liberty Natl. Bank Bldg., Oklahoma City, Okla., $72,568 and $76,405 respectively—Robertson Co., to J. S. Moore & Sons, Lufkin, $34,690—Motley Co. to Field Bros. & McCelvey, Lubbock, $67,278—Crockett and Irion Counties, to Crouch & Noland, Strawn, $35,075—Tarrant Co., to Jagoe Constr. Co., Denton, $26,275—Calhoun, Jackson nad Matagor Counties, to Monarch Eng. Co., Box 962, San Antonio, $93,640—Reeves Co., to J. S. Harrison Constr. Co., Box 1402, Waco, $18,795—Colorado, Co., to Austin Bridge Co., 1813 Clarence S., Dallas, $125,079—Jim Wells and San Patricia Counties to R. W. Briggs Co., Pharr, $174,495—Kendall Co., to Cage Constr. Co., Taft, $33,943. Grand total $758,243. Noted July 30.

Tex., Dallas—City, c/o A. R. Johnson, constructing 2 concrete bridges over Waller Creek on East 12th St., to Dallas Constr. Co., 3106 Commerce St., Dallas and Austin, $18,265 est. $40,000.

Utah—State Road Comn., Salt Lake City, 128 ft. rein.-con. bridge and approaches, Juab Co., to F. S. Whiting, Kaysville, $33,345.

Virginia—State Hy. Dpt., Richmond, bridge over Piner River near Lowesville, Amherst Co., to M. S. Hudgins, Roanoke, $7,388—bridge over Brick Kiln Branch, Buckingham Co., and bridge over Stevens Run, Appomattox and Buckingham Counties, to Perkins-Barnes Constr. Co., Inc., Blackstone, $2,589 and $6,010 respectively. Grand total $15,987. Noted Aug. 6.

B. C. Penticton—J. M. R. Fairbairn, ch. engr. Canadian Pacific Ry., Montreal, Que., founds. for 710 ft. trestle bridge on steel towers 176 ft. high, near here, to A. H. Green & Co., Ltd., Nelson, $15,000. Noted July 23.

Ont., Kitchener—L. S. Lichty, Court House, engr., 160 ft. span, steel truss bridge, 20 ft. roadway, concrete abutments, concrete work to Lichty Bros., Wellesley; steel truss to Hamilton Bridge Co., Ltd., Bay St., N., Hamilton. Est. $25,000. Noted May 14.

Ont., Orangeville—Dufferin Co., 120 ft. concrete truss span bridge over Grand River, near Grand Valley to Finnigan & Mobray, Dungannon; 50 ft. span rein.-con. bridge near Mulmur, to D. L. Webber, Kimberly. Est. $25,000. Noted June 11.

Ont., Pembroke—Dpt. Northern Development, Parliament Bldgs., Toronto, 60 ft. steel truss bridge on concrete abutments, with concrete flooring; 20 ft. span concrete beam bridge; widening 4 x 8 ft. concrete box culvert on North Bay, Pembroke trunk road to J. S. Leitch, 32 Belsize Dr., Toronto. Est. $25,000.

Ont., Windsor — Windsor Suburban Area Comn., Canada Bldg., 150 ft. concrete, steel hy. bridge over Pike Creek, Maidstone Twp., to Keystone Constr. Co., Windsor. Est. $25,000.

STREETS AND ROADS

BIDS ASKED

Calif., Los Angeles—Bd. P. Wks., City Hall, rejected bids July 29, concrete paving Morningside Way and Gyndon Ave. Imprvt. Dist. J. J. Jessup, City Hall, engr. Noted July 23.

Connecticut—Aug. 24, by State Hy. Comn., Hartford, gravel surfacing in Cheshire, Essex, Ledyard, New Hartford, Oxford, Preston, Salisbury, Stafford, Tolland, Torrington, and Warren, J. A. Macdonald, state hy. comr.; adv. E. N.-R. Aug. 20.

Conn., Stamford—Aug. 31, by Common Council, curbing, sidewalks, sewers, paving Shippan Ave. W. S. Conlon, city engr.; adv. E. N.-R. Aug. 20.

Illinois—Aug. 24 by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete, bituminous filled brick on concrete, or bituminous concrete (fine or coarse graded aggregate type) on concrete paving 0.33 mi. Route 5, Sect. 6-S, Dist. 1, Cook and Du Page Counties—0.77 mi. Route 18, Sect. 7R-1—3.14 mi. Route 19, Sect. 86-Y—2.92 mi. Route 19, Sect. 88-Y—1 mi. Route 46, Sect. 464-M-Y—0.5 mi. Route 49, Sect. 146-X, all Dist. 1, Cook Co.—4.1 mi Route 53, Sect. 533—0.73 mi. Route 54, Sect. 544-X, both Dist. 1, DuPage Co.—2.4 mi. Route 127, Sect. 103, Dist. 8, Montgomery Co.—3.53 mi. Route 150, Sect. 134—3.38 mi. Route 150, Sect 135, both Dist. 9, Alexander Co.—grading, drainage structures, 0.36 mi. Route 18, Sect. 8-V-A, Dist. 1, Cook Co.—7.86 mi. Route 104, Sect. 121-A, Dist. 6, Brown Co.—7.95 mi Route 104, Sect. 122-A, Dist. 6, Brown and Pike Counties—3.02 mi. Route 143, Sect. 105-A, Dist. 9, Saline Co.—10.66 mi. Route 148, Sect. 120-A, Dist. 7, Jefferson Co.—2.32 mi. Route 150, Sect. 133-A, Dist. 9, Alexander Co. F. T. Sheets, ch. engr. Noted Aug. 6.

Illinois—Aug. 24, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 1.74 mi. 20 ft., Route 54, Sect. 542, Dist. 1 DuPage Co.; 0.99 mi. 18 ft., Route 61, Sect. 112-X, Dist. 1, McHenry Co. State will furnish cement. F. T. Sheets, hy. engr.

Illinois—Sept. 1, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete surfacing 0.32 mi., Route 77, Sect. 105-W and 0.11 mi., Route 77, Sect. 105-W1, both Dist. 2, Ogle Co. F. T. Sheets, hy. engr.

Illinois—Sept. 1 (extended date), by State Dept. P. Wks. & Buildings, Div. Hys., Springfield, concrete bituminous filled brick on concrete or bituminous concrete (fine or coarse aggregated type) on concrete surfacing—8.178 mi. Route 48, Dist. 1, Sect. 135—7.05 mi. Route 48, Sect. 136, both Dist. 6, Christian Co.—7.35 mi. Route 48, Sect. 137, 20 ft. Dist. 6, Christian and Montgomery Counties—10.84 mi. Route 71, Sect. 115, 18 ft., Dist. 2, Lee and De Kalb Counties—5.97 mi. Route 99, Sect. 105, 18 ft., Dist. 4, McDonough Co.—3.71 mi. Route 104, Sect. 141, 18 ft., Dist. 6, Sangamon Co.—2.31 mi. Route 104, Sect. 143-X, 18 ft., Dist. 6, Christian Co.—5.38 mi. Route 120, Sect. 115, 18 ft., Dist. 5, Piatt Co.—2.51 mi. Route 127, Sect. 103, 18 ft., Dist. 8, Montgomery Co.—4.95 mi. Route 130-A, Sect. 101, 18 ft., Dist. 7, Jasper Co.—3.44 mi. Route 150, Sect. 134—3.42 mi. Route 150, Sect. 135, both 18 ft., Dist. 9, Alexander Co.—2.7 Mi. Route 178, Sect. 106, 18 ft., Dist. 3, La Salle Co.—grading, drainage structures, 3.58 mi. Route 89, Sect. 105-A, Dist. 3, Marshall Co.—3.6 mi. Route 100, Sect. 123-A, Dist. 8, Pike Co.—6.91 mi. Route 100, Sect. 124-A, Dist. 8, Calhoun Co.—2.43 mi. Route 124, Sect. 101-A—5.19 mi. Route 124, Sect. 102-A, both Dist. 6, Sangamon Co.—5.54 mi. Route 146, Sect. 104-A, Dist. 9, Union Co.—6.76 mi. Route 147, Sect. 116-A, Dist. 9, Johnson and Pulaski Counties—10.66 mi. Route 148, Sect. 120-A, Dist. 7, Jefferson Co.—6.73 mi. Route 150, Sect. 122-A, Dist. 9, Jackson and Randolph Counties. F. T. Sheets, hy. engr. Noted Aug. 6.

Indiana—Sept. 1, by J. J. Brown, dir. State Hy. Comn., Indianapolis, grading, drainage structures 5.31 State Project 275, Contract 156, State Rd. 1 Sect. A from intersection with State Rd. 50 north to Milan, Ripley Co.; 2.931 mi. State Project 208-A, Contr. 162, State Rd. 64, Sect. F from Crawford-Dubois Co. Line through Birdseye, DuBois Co.

Ind., Columbia City—Sept. 8, by Bd. Comrs. Whitley Co., gravel surfacing 15,953 ft. East Glick Rd. $16,864; 15,839 ft. Henry Steele Rd. $16,419. E. Cotterly, Columbia City, engr.

Ind., Evansville—Aug. 27, by Bd. Comrs. Vanderburgh Co., rock and gravel surfacing Adler Rd. $21,935. E. D. Koenemann, Evansville, co. aud.

Ind., Terre Haute—Aug. 28, by Bd. Comrs. Vigo Co., concrete surfacing R. G. Weber Rd. $16,234 — gravel surfacing William Schommer Rd. $16,094—brick surfacing Charles N. Smith Rd. $11,705. C. C. Pinson, Terre Haute, aud.

La., Crowley—See "Contracts Awarded."

La., New Orleans—Aug. 25, by City Council, various types wearing surface on concrete paving 6,719 ft. St. Roch Ave. from Gentilly Rd. to Dreaux Ave.—2,646 ft. North Robertson St. from Lofitte to Esplanade Ave. $30,000—4,210 ft. Taylor St. from Clara to Broad Sts. $60,000—3,258 ft. Art St. from Gentilly Rd. to Breaux Ave. $30,000—3,269 ft. Musi St. from Gentilly Rd. to Dreaux Ave. $40,000—3,645 ft. Painters St. from Gentilly Rd. to Dreaux Ave.—sidewalks, sub-surface drains, concrete paving 1,106 ft. Solomon St. from Boudin St. to Tulane Ave. $25,000—1,857 ft. Henry Clay Ave. from Prytania St. to St. Charles Ave. $40,000—1,644 ft. Henry Clay Ave. from Magazine to Prytania Sts. $35,000—685 ft. Saratoga St. from St. Louis to St. Peters Sts., 301 ft. Monroe St. from Apricot to Pritchard Sts. and 692 ft.

Streets and Roads (Continued)

Broad Pl. from Loverline to Bway. $35,000—1,852 ft. Reynes St. from Charters St. to St. Claude Ave. $36,000—1,400 ft. Dreaux Ave. from St. Rock to Franklin Sts. $28,000—sidewalks, sub-surface drains, various types paving 1,529 ft. Fairmont Dr. from Montpelier St. to Gentilly Rd. $31,000—1,852 ft. Lozardi St. from Charters St. to St. Claude Ave. $37,000—400 ft. Conti St. from North Peters St. to Dock Board Rd., 400 ft. Bienville St. from North Peters St. to Dock Board Rd., 651 ft. Apricot St. from Joliet to Monroe Sts. and 300 ft. Arabella St. from Garfield to Hurst Sts. $34,000—sidewalks, sub-surface drains, manholes, handholes, cleanouts 6,719 ft. St. Rock Ave. from Gentilly Rd. to Dreaux Ave.—3,645 ft. Panters St. from Gentilly Rd. to Dreaux Ave. $35,000—3,269 ft. Music St. from Gentilly Rd. to Dreaux Ave. $32,000—2,647 ft. North Roberts St. from Lofitte St. to Esplanade Ave. $25,000—4,210 ft. Taylor Ave. from Clara to Broad Sts. $40,000—3,248 ft. Arts St. from Gentilly Rd. to Dreaux Ave. $28,000.

Maryland—Aug. 25, by State Roads Comn., Baltimore, concrete paving 1.33 mi. Contr. D-83-14, Dorchester Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.

Md., Baltimore—Aug. 26, by Bd. Awards, concrete paving 10,830 sq.yd. alleys in Alley Contr. 146. N. L. Smith, Municipal Bldg., hys. engr.

Massachusetts—Aug. 25, by Dpt. P. Wks., Boston, bituminous macadam paving 4,763 ft. hy., Brockton—1,520 ft. hy., Brookfield—2,300 ft. hy., Seekonk—gravel or bituminous macadam paving 4,825 ft. hy., Randolph—bituminous macadam or bitulithic concrete paving 900 ft. hy., Concord—rein.-con. paving 3,100 ft. hy., Framingham. A. W. Dean, Dpt. P. Wks., Boston, engr.

Massachusetts—Sept. 1, by Dpt. P. Wks., Boston, rein.-con. paving 22,151 ft. hy., incl. steel plate girder and rein.-con. bridges, Uxbridge. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Needham—See "Contracts Awarded."

Mass., Waltham—Sept. 1, by Comrs., Middlesex Co., Court House, East Cambridge, grading, sidewalks, grading roads, paths at Middlesex Co. Sanatorium. $25,000. H. Movius, 91 Newbury St., Boston, landscape archt.

Missouri—Aug. 28, by State Hy. Dpt., Jefferson City, roads in Nodaway, Monroe, Stone, Henry, Wright, Dunklin, Scott, Douglas and Ozark Counties.

Mo., St. Louis—Aug. 25, by Bd. P. Serv., City Hall, concrete paving 7,200 sq.yd. Chippewa St. from point 250 ft. west of Brannon Ave. to Tama Ave., $15,000—grading, concrete paving 9,800 sq.yd. of Kingshighway northwest from Hills Ferry Rd. to Bway., $28,400—11,680 sq.yd. Riverview Dr. from Bway. to St. Cyr Ave., $32,600—vibrolithic concrete paving 2,065 sq.yd. 10th St. from Lynch to Sidney Sts., $13,040—asphaltic concrete paving 1,700 sq.yd. Penrose St. from Cintra to Marcus Aves. $11,760. W. W. Horner, City Hall, engr.

Mo., St. Louis—Sept. 1, by Bd. Pub. Serv., 208 City Hall, asphalt paving 5,340 sq.yd. Hodiamont Ave., $27,160—warrenite bitulithic paving 6,350 sq.yd. Juniata St., $32,280—asphaltic concrete paving 10,605 sq.yd. Nottingham Ave. and 8 streets, $63,940. W. W. Horner, city engr.

Mo., St. Louis—Sept. 8, by Bd. P. Wks., City Hall, grading, concrete paving alleys in City Blocks 991, 2682, 2747, 2838, 3624, 3625, 3978, 4257, 4573, 5276, 5771, 5815, 5826N, 5838, 5916 and 6061. $49,510. W. W. Horner, city engr.

New Hampshire—Aug. 27, by State Hy. Dpt., Concord, 3 in. bituminous macadam surface course on 3 in. broken stone surfacing 4.67 mi. Daniel Webster Rd., 20 ft., Grafton Co., $196,000; 1.26 mi. South Side Rd., 20 ft., Cheshire Co. $36,000.

N. J., Asbury Park—Sept. 9, by Bd. Freeholders Monmouth Co., Court House, Freehold, grading, concrete paving 29,558 sq.yd. Asbury Ave., Rd. 36, Sect. 3, Shrewsbury Twp. G. K. Allen, Jr., 60 Broad St., Red Bank, co. engr.; adv. E. N.-R. Aug. 20.

N. J., Hopewell—Aug. 25, by Hopewell Twp. Comn., bituminous penetration on 5 in. compacted macadam paving 19,200 sq.yd. Bear Tavern-Jacob Creek Rd. A. D. Bullock, 128 West State St., Trenton, engr.

N. J., Newton—Aug. 25, by Bd. Freeholders Sussex Co., Court House, rein.-con. surfacing 23,627 sq.yd. Newton-Sparta Rd., Sparta Twp.; rein.-con. paving 2,830 sq.yd. and graveling 2,100 sq.yd. Mill St., Hamburg Boro. H. Snook, Newton, co. engr.; adv. E. N.-R. Aug. 20.

N. Y., New York—Aug. 27, by S. Levy, pres. Manhattan Boro., Municipal Bldg., grading, granite block on concrete paving 91st and Canal Sts.—asphalt block on concrete paving East 70th St.—sheet asphalt on concrete paving Bway. and East 100th St.

New York—Aug. 31, by Westchester Co., Park Comn., 72 West Pondfield Rd., Bronxville, grading, concrete paving 13,500 cu.yd. Saw Mill River Parkway from Bronx Parkway extension at Hawthorne to Manville Rd., Pleasantville, Contr. 350. J. Downer, ch. engr.; adv. E. N.-R. Aug. 20.

New York—Sept. 9, by A. W. Brandt, comr. Hys., Albany, improving hys. in Cayuga, Rockland and Westchester Counties: reconstructing hys. in Franklin, Monroe, Nassau, Onondaga, Rensselaer, Warren, Saratoga, Washington and Yates Counties; adv. E. N.-R. Aug. 20.

O., Cleveland—Aug. 21, by Comrs. Cuyahoga Co., retaining wall on north side of Cedar Glen Rd., 113,400 lb. reinforcing steel, 1,160 sq.yd. concrete, $37,924. F. Williams, Court House, engr.

O., Jefferson—Aug. 24, by Comrs. Ashtabula Co., grading, culverts, bituminous macadam resurfacing Cold Springs Rd. $41,000.

Pennsylvania—Aug. 28, by State Hy. Dpt., Harrisburg, grading, drainage structures, bridges, one course rein.-con. paving 18,299 sq.yd. Routes 64, 65 and 66, Clarion Boro, Clarion Co.—grading, drainage structures, bridges, one course rein.-con. paving 43,679 sq.yd., bituminous surface treated macadam surfacing 20,872 sq.yd. Route 129, Sect. 1, Steelton and Middletown Boros, Lower Swatara Twp., Dauphin Co.—grading, drainage structures, one course rein.-con. paving 668 sq.yd. Route 153, Sect. 6, Whitemarsh Twp., Montgomery Co. S. S. Lewis, secy.

Pa., Greentree—Sept. 7, by Boro. H. Wohlwend, Municipal Bldg., curbing, guttering, grading, concrete paving 2,500 ft. Manilla Ave. between Greentree Rd. and Grenmount Ave. $25,000.

Pa., Phila.—Sept. 1, by Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, grading 16 streets and avenues — Schedule B, asphalt paving (assessment work), 6 streets and avenues—Schedule C, county road improving 12 streets and avenues—Schedule D, asphalt repaving 4 streets and avenues — Schedule E, redressed granite block repaving 1 street—Schedule F, gunite repairs to Bustleton Ave. and Krewston Rd. Bridges.

South Carolina—Aug. 25, by State Hy. Comn., Columbia, concrete paving 127 mi. roads, bituminous surfacing 81 mi. roads and 33 mi. earth type roads and 9 bridges in Orangeburg, Bamberg, Chester, Laurens, Darlington, Marlboro, Newberry, Chesterfield, Abbeville, Spartanburg, Greenville, Barnwell, Edgefield, Saluda, Allendale, Hampton, Greenville, Anderson, McCormick, Dillon, Aiken, Colleton, Lancaster, Florence, Greenwood and Union Counties. $3,500,000.

Tex., Brownsville—City Bd. bids about Aug. 25, concrete paving 4 blocks West 3rd St. $30,000.

Tex., Houston—Aug. 31, by City and Harris Co., at office City Secretary, paving East 20th and West 20th Sts.

Virginia—Sept. 1, by State Hy. Dpt., Richmond, grading, drainage structures 0.3 mi. Franklin Rd., Route 12, Project F-160-A1 B1 Southampton Co.: 73 ft. bridge, incl. two 35 ft. rein-con. spans over Hazel Run, near Fredericksburg, Route 13, Project F-205-B1, Spotsylvania Co. H. G. Shirley, hy. engr.

W. Va., Charleston—Aug. 24, by Bd. Comrs. Kanawha Co., Court House, grading, drainage structures 3 mi. Ronda-Giles Rd. on Cabin Creek, Project 283-C—surface treating 3.5 mi. right fork Poca River Rd., Projects 224-A, 217-A and 176-C—Miami Bridge 128 over Cabin Creek, incl. substructures, 2 abutments, 2 piers, Dawes Bridge 129 over Cabin Creek, substructure, 2 abutments 2 piers, Project 238-E—Davis Creek Bridge 127, substructure, 2 abutments, Project 255. E. D. Yewell, engr.

W. Va., Moundsville—Sept. 1, by City Council, 7 in. rein.-con. paving 18 blocks 7th and Henrietta Sts. $20,000. J. J. Sammons, Moundsville, engr.

Wisconsin—Aug. 28, by State Hy. Comn., Grant Co., and City of Lancaster, Court House, Lancaster, curbing, sidewalks, alternate types paving 1.7 mi. Lancaster-Beetown and Lancaster-Platteville Rds., S. T. Hy. 14, S.P. 9413 and 9414.

Wisconsin—Aug. 31, by State Hy. Comn. and Hy. Com. Douglas Co., Superior, grading, draining bridging 9.5 mi. road.

Ont., Ottawa—See "Contracts Awarded."

CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, grading 10.2 mi., bituminous treated crushed gravel or stone surfacing 1.5 mi., widening with bituminous treated crushed gravel or stone borders 8.7 mi. road in Humboldt Co., to Hemstreet & Bell, Marysville, $118,323—crusher run rock borders on 9.6 mi. road in Santa Barbara Co., to Gist & Bell, Arcadia, $29,425 — rock borders 5.2 mi. Santa Clara Co., to Granite Constr. Co., Watsonville, $10,540—grading, concrete paving 1.1 mi. San Diego Co., to W. Trepte, Scripps Bldg., San Diego, $106,705—widening with bituminous treated crushed gravel or stone borders 6.6 mi. Butte Co., to United Contg. Co., Stock Exch. Bldg., Portland, Ore., $26,952—gravel base surfacing 12.3 mi. Lake and Colusa Counties, to Frederickson & Watson and Frederickson Bros., 354 Hobart Bldg., Oakland, $50,905—grading, untreated crushed gravel or stone surfacing 5.1 mi. Del Norte Co., to Healy-Tibbitts Constr. Co., 64 Pine St., San Francisco, $113,969. Grand total $456,819. Noted July 9.

California — State Hy. Comn., Sacramento, bituminous treated crushed rock surfacing road between 14 Mile Stone and Fresh Pond, El Dorado Co., to C. E. Reed, Tracy, $12,745.

Calif., Fullerton—Curbing, guttering, rein.-con. bridge, sewers, sidewalks, 6 in. asphaltic concrete paving 38,140 sq.ft., asphalt resurfacing 69,540 sq.ft. North Spadra Rd. between West Chapman Ave. and Pacific Electric Railway Arch, to Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles, $30,610. Noted July 23.

Calif., Huntington Park — Grading, curbing, guttering, sidewalks, ornamental lighting system, c.i. pipe, asphaltic concrete paving 310,000 sq. ft. Florence Ave., et al., to Griffith Co., Railway Bldg., Los Angeles, $180,840.

Calif., Long Beach—City Council, grading, curbing, sanitary sewers, 6 in. concrete paving Ocean Ave., between Termino Ave. and 52nd St., to D. P. Durham, 900 Raymond Ave., $26,972. Noted Mar. 19.

Calif., Los Angeles—Bd. P. Wks., City Hall, gravel surfacing 5 mi. 1-A and 1-C, State Aid Route 8, to T. O. Miles, 553 Mulberry St., Galesburg, $12,350, grading, culverts same road, to Cameron, Joyce & Co., Keokuk, Ia., $7,924, est. $25,000.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, guttering, sidewalks, sewers, water service pipes, 6 in. concrete paving 186 sq.ft. 6 in. asphaltic concrete (Durite) paving 208,461 sq.ft., oiling 118,989 sq.ft. Belleporte Ave. between Weston and Anaheim Sts., to Curtis Paving Co., 2440 East 25th St., $78,798.

Calif., Los Angeles—Los Angeles Co., grading, drainage structures, pedestrian tunnels, sidewalks, sewers, street lighting system, 6 in. rein.-con. paving 164,090 sq.ft. and 2-in. asphaltic concrete on 4 in. concrete paving 48,760 sq.ft. The Strand, et al., near Manhattan Beach, to J. C. Hickey, 3320 Palm Ave., Alhambra, $99,600. Est. $112,610.

Calif., Los Angeles—Los Angeles Co., grading, curbing, guttering, sewers, sidewalks, 2 in. on 6 in. asphaltic concrete paving 104,910 sq.ft., 1½ in. oil macadam paving 34,212 sq.ft. Sepulveda Blvd. between Wilshire Blvd. and Bolas St., to P. J. Akmadzich, 3028 Gilroy St., $24,224.

Calif., Los Angeles—City Council, improving Slauson Ave. between Central Ave. and Figueroa St., to Griffith Co., Railway Bldg., $126,580.

Ill., Galesburg—Bd. Local Impvts., City Hall, grading, curbing, guttering, vitr. brick on 6 in. concrete paving South Cherry St., to Graham-King Constr. Co., 550 South Cedar St., $23,710. Est. $25,000.

Indiana—State Hy. Comn., Indianapolis, concrete paving 16.301 mi. Elkhart Co., and 8.786 mi. Kosciuski Co., to E. W. David Constr. Co., Inc., Michigan City, $256,940 and $137,020 respectively, est. $375,450 and $198,773 respectively—0.759 mi. Jennings Co., and 3.491 mi. Ripley Co., to Sherrill-Blackwell Constr. Co., Bedford, $14,410 and $58,747 respectively, est. $20,219 and $73,747 respectively. Grand total $407,117. Noted July 9.

Indiana—State Hy. Comn., Indianapolis, grading, guard rail, metal shoulders, concrete surfacing 8.465 sq.yd. Rd. 2, Project 138AL, Lake Co., to C. W. Bridges, Coatesville, $18,581 est. $21,765; 22,424 sq.yd. Roads 43 and 52, Projects 224 and 154 Tippecanoe Co., to D. Renfrew Constr. Co., Lafayette, $57,107 est. $75,537. Noted July 9.

Ind., Bloomfield—H. Rollins, aud. Greene Co., stone surfacing John W. Arthur, Willis Smith and D. A. Whitley Rds., and gravel surfacing M. L. Hamilton Rd., to Hostetter Bros., Cincinnati, Ind., $12,698, to E. C. Wright, Bloomfield, $6,000, to Moore Contr. Co., Bloomfield, $4,476 and to Brock & Hasler, Newberry, $3,993. Grand total $27,167. Est. $47,063. Noted July 16.

Ind., Brookville—Franklin Co., gravel and stone surfacing 4 mi. John A. Dudley Rd., to C. J. Van Ausdal, Eaton, $34,376. Est. $51,738. Noted July 30.

Ind., Crown Point—Lake Co., concrete surfacing 3 mi. Charles M. Scott Rd., to Proudfoot Constr. Co., Hammond, $105,400. Est. $150,000. Noted July 16.

Ind., Goshen—Elkhart Co., concrete surfacing County Unit Road 16, to McClintic-Colwell & Gordy, Syracuse, $19,500. Est. $25,000. Noted July 23.

Ind., Martinsville—Morgan Co., rock surfacing Whiteside Rd., to J. Bearcraft, Martinsville, $11,280—Curtis Rd., to W. E. Pickens, Cloverdale $9,885—Costian Rd., to W. H. Thomas, Martinsville, $6,677. Grand total $27,842.

Ind., New Albany—Floyd Co., gravel surfacing Cunningham and Sarles Rds., to Straw & Siegel, New Albany, $16,434; Scottsville and Novilleton Rds., to M. M. Best, New Albany, $13,248. Noted July 23.

Ind., Scottsburg—Scott Co., improving W. O. Green Rd. to E. E. Jones & Son, Madison, $9,087; J. W. Irvin Rd., to L. E. Clark, Scottsburg, $5,294. Est. $25,000. Noted July 23.

Ind., South Bend—St. Joseph Co., concrete surfacing 3 mi. Madison-Ironwood Rd., to Rieth-Riley Constr. Co., Goshen, $16,845, est. $24,400—gravel surfacing 1.75 mi. Harrison Rd. and 1.5 mi. Riley Rd., to H. E. Stroh, Garrett, $10,580 and $8,870 respectively, est. $17,300 and $11,600 respectively. Grand total $36,295. Noted July 23.

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Streets and Roads (Continued)

Ind., Valparaiso—Porter Co., concrete surfacing 1.346 mi. William J. Ameling Rd., to Sunderman Constr. Co., Gary, $36,241. Est. $41,357. Noted July 23.

Ind., Winchester—Bd. Comrs. Randolph Co., bituminous top surfacing Alonza Harmeson Rd. and Mahlon O. Evans Rds., to Hayes Constr. Co., Winchester, $29,535. Noted July 26.

Ia., Audubon—Audubon Co., grading 7.21 mi. trunk roads, to Mauch Bros., Ida Grove, $18,565; 10 rein.-con. box culverts, to C. W. Akin, Atlantic, $10,440.

Ia., Cherokee—Bd. Comrs. Cherokee Co., grading secondary road system, to M. T. McGuire, Algona, $5,302; gravel surfacing, to C. A. Emery, Coon Rapids, $17,139.

Ia., Des Moines—City Council, 7 in. concrete paving 669 sq.yd. Columbus Ave., to Amodeo Paving Co., Des Moines, $1,040—8,271 sq.yd. Seneca Ave., to Wright Constr. Co., 1325 Maine St.—1½ in. sheet asphalt on present base resurfacing 11,306 sq.yd. Clark St., to Municipal Eng. Co., 421 Hubbell Bldg., $11,476.

Ia., Indianola—Auditor Warren Co., grading 7.41 mi. trunk roads, to Anderson & Empie, Marshalltown, $16,996; culverts, to Des Moines Steel Co., Des Moines, $1,000. Noted July 23.

Ia., Lansing—F. L. May, city clk., curbing, guttering, concrete paving 9,345 sq.yd., to McKinzie & Killen, Lansing, at $2.01 per cu.yd. Noted July 16.

Ia., Ottumwa—City Council, guttering, warrenite resurfacing Main St., to J. Blunk, Ottumwa, $31,098.

Ia., Sac City—Bd. Comrs. Sac Co., gravel surfacing and maintenance graveling 31.5 mi. roads to Onnen Bros., Rockwell.

La., Crowley—City Council, concrete surfacing West 5th St., from Parkerson St. to F Ave., to McGuire & Cavender, Texarkana, $3,648; State will lay concrete slab curb on Ave. F and Eastern Ave., own forces, $47,277.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 0.83 mi. Contr. B-174-43, Baltimore Co., to H. T. Campbell Sons Co., Towson, $26,273. Noted June 4.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 1.52 mi. Contr. Ce-110-24, Cecil Co., to Phillips Bros., Salisbury, $29,780. Noted June 11.

Maryland—Dpt. P. Wks., State Roads Comn., Baltimore, concrete paving 1.4 mi. Contr. P-135-34, Prince George Co., to Christhilf & Ensey, 1625 Ridgely St., Baltimore, $20,145. Noted Aug. 13.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 2.05 mi. Contr. B-218-411, Baltimore Co., to Raffaele Marcantoni, 313 South Exeter St., Baltimore, $10,595; graveling 2.05 mi. Contr. C-55-82, Calvert Co., to Boatwright, Russell & Linton, Manassas, Va., $15,550. Noted July 30.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., sheet asphalt paving 1 mi. Contr. Bc-108-74, Baltimore City, to Baltimore Asphalt Block & Tile Co., 1320 North Monroe St., Baltimore, $73,070. Noted Aug. 6.

Md., Baltimore—Bd. Awards, grading 30,000 cu.yd. streets listed in Contr. 599, to P. Reddington & Son, 2 East Lexington St., $11,450. Noted July 30.

Md., Baltimore—Bd. Awards, concrete paving 11,000 sq.yds. alleys in Alley Contr. 145, to Mahoney Bros., 1111 Rutland Ave., $16,816.

Md., Towson — Baltimore Co., 20 in. concrete curbing, concrete paving Leeds Ave., Group 5, to Geo. P. Mays, Cockeysville—concrete shoulders on Moffett Ave., Group 4, to A. M. Mayer, Rolling Rd., Baltimore—Edmondson Ave., Group 3, to C. E. Hopps, 1553 Homestead St., Baltimore.

Massachusetts—Dpt. P. Wks., Boston, gravel and bituminous macadam paving 1,400 ft. hy. Mandon, to E. L. Sabatinelli & Sons, Mendon, $4,789—1,169 ft. hy. Shirley, to G. H. Pierce, 15 Hollis St., Groton, $12,181—500 ft. hy. Danvers, to J. J. Watkins, 18 Glenwood St., Amesbury, $4,691—8,437 ft. hy. Belchertown, to R. H. Newell Co., South Main St., Uxbridge, $44,039. Grand total $65,700. Noted July 30.

Massachusetts—Dpt. P. Wks., State House, Boston, A. W. Dean, engr., bituminous macadam surfacing 27,162 ft. hy. Gill and Greenfield, also steel deck girder bridge over Falls River, Gill and Greenfield, to Kelliher Corp., Turners Falls, $356,234. Former contract rescinded. Noted Aug. 13.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Erie St., Dorchester, to A. R. Doyle, 44 Perkins St., Jamaica Plain, est. $25,000. recut granite block paving Summer St., Ward 6, to J. J. McCarthy, 121 Boston St., Dorchester, $46,825. Noted July 20 Daily.

Mass., Melrose—Dpt. P. Wks., granolithic sidewalks, driveways to Geo. Rotundi & Son, 199 Laurel St., Est. $25,000.

Mass., Needham—Town, sheet asphalt, tar and gravel paving Greendale Ave., day labor. Est. $25,000. L. C. Hollis, Town Hill, engr.

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Michigan—State Hy. Dpt., Lansing, grading, resurfacing 6.3 mi. MO66-15C-1, 16 ft., Ontonagon Co., to Maintenance Division, B. C. Tiney, maint. engr., Lansing, $40,000.

Michigan—State Hy. Dpt., Lansing, grading, concrete paving 1.491 mi. F09-20 C-1, 20 ft., Ray Co., to A. Jeffrey, Saginaw, $33,186.

Mich., Flint—Genesee Co. one course 8 in. slab concrete paving 2.5 mi. West Court St., Beecher Road and Ohio Road Cut-off 20 ft., to M. W. Cochrane, Birmingham, $54,138.

Mich., Mt. Clemens—Macomb Co., widening, grading, one course concrete paving Gratoit Ave. from Nine Mile to Utica Rds., to J. A. Mercier Co., 450 West Fort St., Detroit, $88,000.

Mississippi—State Hy. Comn., Jackson, earth shoulders on sections Lake-Newton Rd., incl. 17,000 cu.yd. borrow excav., 1,000 units overhaul, Newton Co., to Garrigues Bros. Dredging Co., Mathiston. Noted July 23.

Miss., Meridian—W. H. White, city clk., grading, curbing, guttering concrete paving 41st Ave., to Dunn Constr. Co., Inc., Lincoln Life Insurance Bldg., Birmingham, Ala., $5,000; Cooper, 22nd and 35th Aves., to Cobb Bros. Constr. Co., Meridian, $35,000.

Miss., Vicksburg — Bd. Comrs. Vicksburg National Military Park, constructing 16,550 sq.yd. concrete pavement in park, to Miller Hutchinson Co., New Orleans, La., $28,500.

Missouri—State Hy. Dpt., Jefferson City, to Amyx & Mitchell, Bakersfield, crushed stone paving 3.873 mi. Christian Co. $7,738—to L. W. Hayes, Bethany, 3.042 mi. R. SZ, Sect. 1, $9,386; 3.106 mi. Sect. 2, same route $9,389; 1.97 mi. Sect. SA, same route, $2,945, all foregoing Platte Co.; graveling 4.772 mi. St. Clair Co. $19,759; shale and crushed stone paving 1.61 mi. Boone Co. $2,721; 0.906 mi. Sect. 1A, Route SC, $1,537; 5 mi. same route, Sect. 2A, $8,471; 1.989 mi. Sect. SA, $3,353; 0.865 mi. Sect. 4A, $959; 1.599 mi. Sect. 5A, $2,704, all foregoing Howard Co.; chat surfacing 4.782 mi. Route 52, Sect. 14, $27,765; 4.765 mi. Sect. 15, same route $35,994; 4.556 mi. Route 52, Sect. 14, $24,523, all in Henry Co.—to C. F. Johnson & Sons, Buffalo, crushed stone paving and graveling 1.238 mi. Taney Co. $19,284; 2.784 mi. Hickory Co. $6,950—to Gerard Knutson, 3520 Main St., Kansas City, graveling 4.423 mi. Scotland Co. $14,503; 4.434 mi. R. 4, Sect. 62, $22,271; 2.023 mi. same route, Sect. 64, $7,134, both Schuyler Co.—to A. A. Davis Co., Inc., Oklahoma City, Okla., 4.979 mi. R. SD, Sect. 1, $12,420; 1.568 mi. Sect. 2, $5,244, both Osage Co.; 4.079 mi. R. 82, Sect. 6, $26,037; 2.77 mi. R. 82, Sect. 7, $38,506, both St. Clair Co.—to J. A. Kerr, Ozark, 2271 mi R. 2, Sect. 2, $4,278; 2.453 mi. Sect. 3A, $3,846, both Johnson Co.; 3.102 mi. Sect. A, $4,821; 2.315 mi. Sect. 5A, $3,649, both Henry Co.—to M. Wunderlich, 734 Snell Ave., St. Paul, Minn., 4.653 mi. Reynolds Co. $32,021; 2.204 mi. Camden Co. $6,546—to H. H. Carrothers, Kansas City, 0.271 mi. Taney Co. $6,660—to Knox & Penzel, Jackson, 0.879 mi. Cape Girardeau Co. $6,874—to C. K. Kost, Joplin, 1.99 mi. Lafayette Co. $3,710—to Whipple & Irwin, Springfield, 0.486 mi. Moniteau Co. $5,739—to Baker & Sitzes Constr. Co., Sikeston, 4.697 mi. Stoddard Co. $18,496—to I. I. Williams, Monett, 2.195 mi. Stone Co. $18,413—to F. T. Odell, Hannibal, 3.575 mi. Iron Co. $3,793—to C. H. Atkinson Paving Co., Watertown, S. D., grading, concrete paving 3.676 mi. Sect. 119A, $57,508; 3.698 mi. Sect. 118A, $57,645; 2.179 mi. Sect. 117A, $34,237; 3.167 mi. Sect. 120A $47,681, all in Newton Co.—to H. C. Botsford, Kansas City, grading 4.822 mi. R. 4, Sect. 44, $24,569; 4.974 mi. Sect. 42, $55,205; 4.856 mi. Sect. 43, $41,522, all foregoing Putnam Co.—to Simmons & Ferman, LaPlata, 3.572 mi. R. SE, Sect. 1, $8,769; 30.87 mi. Sect. 2 $5,883, both Buchanan Co.—to A. E. Keith Constr. Co., City Bank Bldg., Kansas City, 2.752 mi. Clay Co., $9,670—to Bertman & Menefee, graveling 3.559 mi. R. 19, Sect. 43, $19,235; 2.976 mi. Sect. 44, $21,481; 3.847 mi. Sect. 42, $25,526, all foregoing Shannon Co. Grand total $840,250.

Mo., Clayton — Bd. Comrs. St. Louis Co., rein.-con. paving Ballas Rd., to W. A. Riley, 6221 Olive Blvd., St. Louis, $14,404—Midland Blvd., to Skrainka Constr. Co., Security Bldg., St. Louis, $27,128—Plymouth Ave., to W. A. Riley, Clayton, $22,586—Annie Ave., to W. H. Bleck, 251 Railroad Ave., Ferguson, $4,176. Grand total $68,294. Noted July 30.

Mo., Maplewood—Bd. Aldermen, c/o W. M. Briscoe, city clk., grading 6 in. concrete paving Hiawatha and Williams Aves., to C. M. Berry Constr. Co., 2732 Sutton Ave., $4,468 and $13,143 respectively.

Mo., St. Louis—Bd. P. Serv., City Hall, asphalt on old rein.-con. found. paving 30,000 sq.yd. Washington Blvd., to Bridges Asphalt Paving Co., 1411 Central Industrial St., $66,891. Est. $64,300. Noted July 29.

Mo., St. Louis—Bd. P. Serv., City Hall, to Asphalt Paving Co. of St. Louis, 1328 Sublette Ave., 2 in. cold mix bituminous paving with trap rock and emulsified asphalt aggregate 700 sq.yd. Watson Rd. from Penrod to Marquette Sts., $2,043; 540 sq.yd. Watson Rd. from Marquette to Maurice Aves. $1,665; 375 sq.yd. Watson Rd. from Maurice to Flyer Aves. $1,347—to R. C. Micott, 2516 Arlington Ave., laying 1,870 ft. 20 in. and 240 ft. 6 in. c.i. mains in Sublette Ave. $2,391—to National Water Main Cleaning Co., Chicago, Ill., cleaning 34,000 ft. c.i. pipe, $9,860. Grand total $17,306. Noted July 2.

Mo., St. Louis—Bd. P. Serv., City Hall, asphalt on concrete paving 6,230 sq.yd. Hampton Ave. and 19,110 sq.yd. Hampton Ave., to M. J. Smith, 6771A Nashville Ave., $14,388 and $39,792 respectively—granite curbing, asphalt paving on rein.-con. for top subway High St., to Bridges Asphalt Co., 1411 Central Industrial St., $23,387. Grand total $77,567. Noted July 2.

New Hampshire—State Hy. Dpt., Concord, improving hy. Dover, to Central Constr. Co., Lawrence, Mass., $43,774; in Conway, to R. D. Gillette Constr. Co., Westfield, Mass., $10,145.

New Jersey—State Hy. Comn., Trenton, grading, 9 in. rein.-con. paving 11.71 mi. Middlesex Co., to W. Eisenberg & Sons, Income Insurance Bldg., Camden, $175,812; 3.08 mi. Union Co., to Riverside Concrete Co., Riverside, $240,742. Noted July 30.

N. J., Mountain Lakes—Mayor and Boro Council, Boro Hall, bituminous penetration paving 7,400 sq.yd. Intervale Road Imprvt., to Gray Constr. Co., Franklin St., Morristown. Est. $25,000. Noted July 16.

N. J., New Brunswick—Middlesex Co., Court House, concrete paving Dayton-Jamesburg Rd., to Utility Constr. Co., 5 Spring St., $40,184. Noted Aug. 3.

N. J., North Plainfield — Mayor and Boro Council, Boro Hall, curbing, guttering, paving Green Brook Rd., to J. F. McGreevey & Co., Manasquan, $31,465. Noted July 16.

N. J., Trenton—Hamilton Twp., Comn., bituminous penetration macadam paving 6,000 lin.-ft. Mercerville-White Horse Rd., to E. J. Howell, Trenton, $23,651.

N. Y., New York—S. Levy, pres., Manhattan Boro, Municipal Bldg., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., asphalt paving 88th St., $12,620; West 136th St., $46,889; West 111th St., $12,127—to Carblock Paving Co., Stagg St., Brooklyn, 75th St., $29,857; 88th St. $6,558; 87th St., $10,211—to E. T. Barry, 126-01 139th St., Laurelton, asphalt block paving West 150th St., $7,202; Sheriff St., $6,100; granite block paving 99th St., $11,121. Grand total $142,685. Noted July 30.

N. Y., Brooklyn—H. Hesterberg, pres., Brooklyn Boro, Boro Hall, to Pomonok Asphalt Co., 1246 Grand St., asphalt paving Alabama Ave. $6,208; McKibben St. $28,202—to B. Turecamo Contg. Co., New Cropsey Lane, Beverly Rd. $4,220; East 46th St. $7,408; East 49th St. $9,115; Flatlands Ave. $13,894; Avenue P $12,866; Quentin Rd. $3,212; 24th Ave. $10,482; East 35th St. $4,587 — to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., East 31st St $5,353; East 31st St. $5,709; Dean St. $8,658; Franklin Ave. $62,787; Linden Blvd. $7,861—to D. J. McCoy Asphalt Paving Co., Avenue U and East 57th St., 95th St. $4,887—to Columbia Eng. & Contg. Co., 401 Bway., New York, granite block paving North 5th St. $11,240—to Guimont Contg. Co., 1218 Locust St., North 9th St. $13,689—to A. Suriano, foot 24th Ave., grading East 96th St. $5,758. Grand total $226,138. Noted July 9.

Ohio—O. W. Merrell, dir. hys., Columbus, bituminous macadam paving 8.076 mi. Sect. "S-1" and "S-2" Cincinnati-Zanesville Rd., Warren Co., to Cleveland-Trinidad Paving Co., Grand Theater Bldg., Columbus, $182,312; tar macadam paving 0.66 mi. Sect "Tiffin West" Tiffin-Findlay Rd., Seneca Co., to Brooks Constr. Co., 1123 Barthold St., Ft. Wayne, Ind., $20,306. Noted July 16.

Ohio—O. W. Merrell, dir. hys., Columbus, bituminous macadam paving 2.69 mi. Morrow Co. and tar macadam paving 3.015 mi. Franklin Co., to N. B. Putnam, 2301 Fairfield St., Ft. Wayne, Ind., $29,149 and $65,800 respectively—macadam paving 2.564 mi. Harrison Co., to Albert Ebersbach, Middleport, $31,793—concrete paving 2.436 mi. Sect. "N," Cleveland-Sandusky Rd., Lorain Co., to Ohio Eng. Co., Lorain, $43,100. Grand total $169,842. Noted July 30.

O., Ashland—City, sheet asphalt resurfacing Center St., to Mansfield Asphalt Paving Co., Mansfield, $27,183.

O., Bexley — S. W. Roderick, village clk., grading, curbing, drainage structures, brick paving 1,350 ft. Roosevelt Ave., Brotenahl to Broad Sts., to Cleveland Trinidad Paving Co., Grand Theatre Bldg., Columbus, $28,342.

O., Cadiz—Harrison Co., grading, bituminous macadam resurfacing 6 mi. Bushy Fork Rd. in Green Twp., to Allied Products Co., Wheeling, W. Va., $28,420.

O., Cleveland Heights—City, stone curbing, asphaltic concrete paving Rosedale, Brentwood, Penfield Aves. and Euclid Blvd., to Cleveland Trinidad Paving Co., Western Reserve Bldg., Cleveland, $29,550.

Okla., Tulsa—City Council grading, sidewalks, paving underpass at Outward Ave. and Missouri, Kansas & Topeka R.R. to H. L. Cannady Co., 1116 South Main St., $24,855. Est., $26,847.

Pa., Mt. Lebanon—Bd. Comrs. Allegheny Co., improving Vallevista St., from Ridgedale to Syracuse Sts., to Ben Constr. Co., Hargrove St., Pittsburgh, $17,023.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., to Eastern

Streets and Roads (Continued)

Asphalt Co., Pennsylvania Bldg., grading, improving Cheltenham Ave. from Washington Lane to Ogontz St. $42,255; asphalt paving (assessment work) Courtland St. from D to Hurley Sts., $2,276; 12th St. from Nedro to point 210 ft. south of Champlost St., $3,473; asphalt resurfacing Greene St. from Berkley to Manheim Sts. $5,222—to Union Paving Co., Broad and Stiles Sts., asphalt paving (assessment work) Belfield St. from Louden to Logan Sts., $30,904; Church Lane from Limekiln Pike to 17th St. $2,014; Gratz St. from Limekiln Pike to Godfrey St. and 17th St. from Medary to Stenton Sts., $3,110, Limekiln Pike from Bayard to Cheltenham Sts. $8,672, asphalt resurfacing Group 1, $21,243; Group 2, $16,287 — to Barber Asphalt Co., Hunting Park Ave. E, asphalt paving (assessment work) Erdick St. from Foust to Vankirk Sts. $3,927; Howard St. from Courtland to Winghocking Sts. $4,254—to Municipal Constr. Co., Washington Square Bldg., Herbert St. from Lackawanna to Valley Sts. $2,386—to R. Hauff, Real Estate Trust Bldg., cleaning, paining bridge $1,664. Grand total $147,687. Noted Aug. 6.

R. I., Pawtucket—City Council, 3 in. bituminous on 6 in. concrete paving 25,000 sq.yd. Newport Ave., to J. McCormick, 315 Taunton Ave., East Providence, $47,977.

Texas—State Hy. Dpt., Austin, traffic bound macadam paving 8.088 mi. Palo Pinto Co. and 11.486 mi. Aransas Co., to Brown & Root, Inc., Colorado St., Austin, $37,866 and $35,168 respectively—bituminous surface on limestone and gravel paving 7.285 mi. Ellis and Dallas Counties, to A. P. Turner, Marshall, $51,319—17.022 mi. Gray Co. and 13.628 mi. Karnes Co., to Cocke & Braden, Marshall, $125,176 and $81,322 respectively—grading, limestone rock asphalt on caliche paving 2.742 mi. San Patrico Co., to Nueces Constr. Co., Corpus Christi, $55,462—asphalt surfacing 19.756 mi. Sterling Co., to Dozier Constr. Co., Littlefield Bldg., Austin, $112,458—10.3 mi. Brown Co., to E. R. Leach, 1212 Allen Bldg., Dallas, $92,213—grading, drainage structures 10.143 mi. McLennan Co. and 13.75 mi. Wharton Co., to E. G. Powell, Box 996, Jacksonville, $47,307 and $43,632 respectively—7.194 mi. DeWitt Co. and 13.854 mi. Jime Wills and Leeberg Counties, to F. P. McElwrath Constr. Co., P. O. Box 727, Corsana, $27,798 and $43,151 respectively — 10.72 mi. Jackson Co., to C. T. Ingram, Cuero, $33,233—15.721 mi. King Co., to Mims & Frost, Hydro, Okla., $50,072—15.006 mi. Crockett Co., to A. D. Murdock, Dallas, $40,777—5.588 mi. Cherokee Co., to G. W. Condon, Dallas, $34,686—11.476 mi. Coleman Co., to J. S. Wade, Box 255, Oklahoma City, Okla., $56,126—10.311 mi. Matagorda Co., to Martin Bros., Goodhue Bldg., Beaumont, $30,522—10,787 mi. Concho Co., to Crouch, Noland, Strawn, $29,825—14.474 mi. Crockett and Irion Counties, to P. W. Bertram, Box 1233, Waco, $35,066—7.501 mi. Calhoun Co., to F. W. Heldenfels, Rockport, $27,596—18.626 mi. Reagon Co., to E. F. Bury & Son, and C. T. Childs, Rising Star, $38,714—20.988 mi. Reeves Co., to C. E. Armstrong & Son, Pecos, $79,295—15.015 mi. Kinney Co., to W. W. Vann Co., Mercedes, $126,278—7.649 mi. Jasper Co., to A. L. Mays, Jasper, $37,478—14.842 mi. Kendall Co., to T. Archer & Co., 308 Baurline St., Fort Worth, $83,283—4.961 mi. Houston and Trinity Counties, to G. E. Lucas, Sacul, $28,066—concrete paving 10.854 mi. Van Zandt Co., to Central Bithulithic Co., Praetor Bldg., Dallas, $187,152—16.883 mi. Grayson Co., to General Constr. Co., 414 Capps Bldg., Fort Worth, $235,175—9.996 mi. Cameron Co., to R. W. Briggs & Co., Pharr, $198,496—8.681 mi. DeWitt Co., to McCall Eng. Co., 307 Amicable Bldg., Waco, $46,679—7.841 mi. Tarrant Co., to Standard Paving Co., 251 Majestic Bldg., Forth Worth, $128,313—2.934 mi. Harris Co., to Russ Mitchell Inc., 710 Petroleum Bldg., Houston, $85,217—17.402 mi. Carson and Potter Counties, to Highway Constr. Co., Daniels Bldg., Tulsa, Okla., $271,814—12.29 mi. Lubbock Co. and 11.498 mi. Amarillo Co., to Wopmack, Henning & Rollins, Sherman, $224,994 and $32,957 respectively—6.46 mi. Potter Co., to E. W. Baker & Co., Perrine Bldg., Oklahoma City, Okla., $104,502—15.3 mi. Grayson Co. and 16.391 mi. Wheeler Co., to Interstate Constr. Co., Lubbock, $222,934 and $260,713 respectively—0.607 mi. Fairfield Co. and 3.635 mi. Madison Co. to J. S. Moore & Son, Lufkin, $42,296 and $20,747 respectively—8.073 mi. Tarrant Co. and 13.867 mi. Denton Co., to Dexter Constr. Co., Hangar 10, Love Field, Dallas, $117,438 and $199,241 respectively—6.906 mi. Panola Co. and 3.125 mi. Harris Co., to S. and H. Constr. Co., 92 Mason St., Milwaukee, Wis., $74,106 and $114,405 respectively. Grand total $4,051,068. Noted July 23.

Tex., Beaumont—To Scott Shambaugh, Beaumont, paving Orleans, Austin, Laurel and Miller Sts., est exceeds $25,000; park improvements, incl. storm sewers, $5,443, to C. F. Myers, Beaumont, paving, $9,267; to Broussard-Walfield Co., Beaumont, sidewalks, $14,470. Noted July 15. Daily.

Tex., Dallas—Dallas Co. warrenite bitulithic paving approaches to Lamar-McKinley St. Viaduct, to Southern Paving Co., Dallas, $22,105.

Tex., Fort Worth—For brick on 6 in. concreate paving Jennings Ave., from West 13th St. to Rio Grande Sts., to Thurber Constr. Co., Forth Worth Natl. Bank Bldg., $44,981.

Tex., Memphis—Hall Co., concrete paving 112,838 sq.yd. road, to Ralph Pleasant, Inc., Amarillo, $209,464. Noted Aug. 6.

Tex., Sweetwater—For bitulithic paving 25,700 yd. streets, to West Texas Constr. Co., Abilene, $29,685.

Tex., Yorktown—City, c/o W. Westhoff, mayor, curbing, 7 in., concrete paving 7 blocks Main St., to Alamo Paving Co., 325 Dawson St., San Antonio, $38,000. Noted Aug. 30.

Virginia—State Hy. Comn., Richmond, macadam paving Route 39, Project F-641-HI Augusta Co., to Meadowview Constr. Co., Meadow View, $31,712; grading, drainage structure 10.241 mi. Route 604, Project S-716-A Essex Co., to C. R. Sanderson & Son, Cartersville, $26,946. Noted July 16.

Wash., Bellingham—Whatcom Co., concrete paving 2 mi. Mountain View Rd., to Riddle, Sisson & Jensen, Bellingham, $30,563. Est. $30,000. Noted July 30.

Wash., Seattle—Paving East Marginal Way, to Moceri Bros., Thompson Bldg., Seattle, $71,627.

Wis., Milwaukee—City, D. McKeith, comr., to N. Harris, 830 East Mason St., paving alley between North 20th and 21st Sts. $1,070; alley between South Lenox and South Williams Sts. $1,202; alley between North 37th and North 18th Sts., $1,083; South 61st St., $786; West Ruby Ave. $453; West Walnut St. $1,017—to Czerwinski Constr. Co., South 16th St. and Morgan Ave., North Montreal St., $716—to Gumz & Switalski, 2065 South 16th St., West Chamber St. $5,222; East Dewey Pl. $7,537; South 66th St. $3,038; West Dewey Pl. $2,679; —to J. C. Bluhm, Station F, West Cherry St. $5,166—to Badger Constr. Co., 425 East Wisconsin St., North 12th St. $25,222; North 49th St. $2,694—to White Constr. Co., 110 East Wisconsin St., South 1st St. $35,158. Grand total $92,243. To N. Harris, 830 East Main St., grading West Stevenson St.

Wis., Wauwatosa—To D and S Constr. Co., 1716 North 37th St., grading, paving Crescent Ave. $1,558; Coolidge Ave. $9,918—to R. L. Reisinger, 4975 North Richard St., Harding Dr. $4,975; North Richards St $6,492; Moore Ave. $9,500—to A. H. Reichard, 706 LeFeber Ave., Wauwatosa, alley between Blocks 4 and 5, $794. Grand total $33,237.

Ont., Brantford—Suburban Area Comn., Court House, concrete paving, grading, 1 mi. Cockshutt Rd., to McArthur Constr. Co., Ltd., Douglas St., Guelph. Est. $25,000.

Ont., Flesherton—Grey Co., (Owen Sound), concrete pacing 1¼ mi. hy., to King Constr. Co., Ltd., Oakville. Est. $30,000.

Ont., Markdale—Grey Co., concrete paving 1¼ mi., to King Constr. Co., Ltd., Oakville. Est. $30,000.

Ont., Marmora—Dpt. P. Hys., Parliament Bldg., Toronto, grading, culverts, Stirling-Marmora provincial hy. to H. T. Routley Co. Ltdd., 21 Dundas St., Toronto. Est. $30,000.

Ont., Ottawa — Asphalt paving Rideau St. from Nelson to Friel Sts. and from Friel to Charlotte Sts., day labor. $88,800. F. C. Askwith, City Hall, engr.

Ont., Ottawa—Carleton Co., retread bituminous macadam paving 3 mi. in Nepean, North Gower and Osgoode Twps., to F. Milligan, Iroquois. Est. $35,000.

Ont., Toronto—Asphalt paving Avenue Road, Sect. A, to McNamara Constr. Co., 53 Yonge St., $24,097—Avenue Road, Sect. B, to Kilmer & Barber Ltd., Harkour Bldg., $24,962—concrete paving 3 lanes, to P. Delgreco, 60 Montcalm Ave., $3,795—2 lanes, to J. Battista, 25 Anderson Ave., $1,674—3 lanes, to E. Mark, 1903 Davenport Rd. $2,700. Grand total $57,228.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Calif., Los Angeles—Bd. Supervs. Los Angeles Co. received no bids constructing Gunite Slabs at Sawpit and San Dimas Dams. Noted July 30.

Kan., Ozawkie—Delaware River Drainage Dist., bids this fall flood control improvements, incl. 400,000 cu.yd. excav. Kansas Eng. Co., 601 Kansas Ave., Topeka, engrs.

Va., Norfolk—City Council removing 50,000 cu.yd. to deepen to 30 ft. the approach from main channel to Army Base Piers, space between piers dredged to 30 ft. depth. Above work will be done by hydraulic proceas. Est. $0.154 per cu.yd. B. F. Tyler Corp., Norfolk, engrs.

BIDS ASKED

Ark., Marked Tree—Aug. 28, by Bd. Comrs. D. D. 7, Poinsett Co., 3,000,000 cu.yd. levees, ditches, hy. embankment, fill. Morgan Eng. Co., Goodwin Institute, Memphis, Tenn., engrs.

Ind., Anderson—Aug. 22, by C. Iliff, supt. constr., Court House, constructing E. H. Peters and Carl Parson Drain, incl. 369,181 cu.yd. excav. O. A. Armfield, atty., Court House, atty.

La., Baton Rouge—Sept. 1, by Police Jury East Baton Rouge Parish, constructing Comite-Bowman Bayou Canal, 2.75 mi. long, incl. 40,000 cu.yd. excav. in 5th Ward. J. J. Mundinger, Baton Rouge, engr.

Pa., Ridgway—See "Dams."

Tex., Brownsville—Bd. Educ. taking bids tile drainage, incl. draining Tucker Field. Private plans.

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., rock and wire mattress for Santa Ana Wash from Foothill Blvd. to Sierra Madre Storm Drain, incl. 15,500 cu.yd. excav., 6,000 lb. placing metal, 6,000 lb. place metal drainage culverts, 60,400 sq.ft. constructing rock and wire mattress, to Dimmitt & Taylor, 815 East 59th St., $10,847; 20,000 cu.yd. excav., to G. C. Bailey, 624 El Centro St., South Pasadena, $6,670; 153,000 sq.ft. guniting channel slopes, 38,000 sq.ft. precast concrete block toe material, 20 cu.yd. rein.-conc., to Cement Gun Constr. Co., 636 East 61st St., $12,709. Grand total $30,226. County Flood Control Dist. furnished cement, reinforcing steel, reinforcing bars, concrete blocks. Noted July 23.

Calif., Oakland—J. H. Kimball, secy. East Bay Municipal Utility Dist., two 225 gal. capacity pumps, 330 ft. head and one 125 gal. capacity pump, 310 ft. head, to Atlas Equipment Co., 507 Chestnut St. $1,079 and $379 respectively; 222,000 gal. steel storage tanks, to Berkeley Steel Constr. Co., 2nd and Carmelia Sts., Berkeley, $3,398; 60,000 gal. steel storage tank, to Steel Tank & Pipe Co., 1100 4th St., $1,660. Grand total $6,516.

La., Shreveport—Caddo Levee Dist., improving 26,000 cu.yd. Thompson Levee, 53,200 cu.yd. Glycerine Bayou Levee, 51,500 cu.yd. Long Point Levee, 6,000 cu.yd. Eagle Lake Sub. Restorement, to New Constr. Co., Shreveport, $18,265. Noted July 23.

N. Y., Buffalo—W. Rathman, city mgr., dredging Buffalo Inner Harbor to completed contract depth for channel maintenance from July 1, 1931, to June 30, 1932, to Great Lakes Dredging Co., Morgan Bldg., at $0.4175 per cu.yd. scow measurement. Est. $90,000. Noted June 11.

O., Cleveland—City, breakwater wall at East 140th St. and Lake Erie, incl. 180,000 tons rip rap stone, to Amer. Constr. Co., 1276 West 3rd St., $524,932.

Tex., Wichita Falls — Wichita Co. D. D. 2, c/o M. Crowell, pres., earthwork, structures in canals, laterals, drains, ditches, approaches and other improvements, to Cowles & Glade, Wichita Falls, $44,407. Noted July 16.

Wis., Milwaukee—Harbor Comn., to Edward E. Gillen, 228 East Water St., docks, filling in land, 1,711 ft. Dock Type B $159.95; 346 ft. Type D $131.50; 33,900 cu.yd. fill, at $0.22 per cu.yd. Noted Aug. 4 Daily.

Bond Elections

Coming Bond Elections

Waterworks—Jasper, Ala., building new waterworks or acquiring plant of Alabama Water Service Co., which now supplies city. $750,000.

Light and Power Plant and System—Plainview, Tex., $100,000.

Bonds Voted

Waterworks Impvts.—Bountiful, Utah, $30,000. Caldwell & Richards, Salt Lake City, Engrs.

Natural Gas Dist. System—Erick, Okla. $25,000. F. Ford, Cordell, engr.

Court House and Jail—Port Arthur, Tex., Jefferson County. $150,000. Architect not appointed.

Bonds Defeated

Waterworks Dist. System — Huntsville, Mo., $35,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ariz., Tucson—SANATORIUM—U. S. Indian Bureau, sketches sanatorium, near San Xavier Mission on Papago Indian Reservation. $128,000. R. H. Bradley, Albuquerque, N. M., engr. Noted June 18.

Calif., Beverly Hills—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Allison & Allison, Hibernian Bldg., Los Angeles, and R. Flewelling, Beverly Hills, U. S. Post Office.

Calif., Merced—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Allison & Allison, Hibernian Bldg., Los Angeles, U. S. Post Office.

Calif., Oroville—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by F. H. Meyer, 544 Market St., San Francisco, U. S. Post Office.

Calif., Palo Alto—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by B. M. Clark, 310 Union Ave., U. S. Post Office.

Conn., New London—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, 150 x 200 ft. brick, stone, steel, plain found. $420,000.

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Federal Government Work (Continued)

Ga., Savannah—HOPPER DREDGE — U. S. Eng., repairing hopper drege Kingman.

Massachusetts—EXCAVATION—U. S. Eng., rock excav. in Taunton River, Taunton and Dighton.

Mass., Norwood—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, 100 x 105 x 215 ft., stone, Washington St. near Central St. $130,000.

N. Y., Albany—COURT HOUSE, etc.—Treas. Dpt. at office Sup. Archt., bids in December general contract, 4 story court house and customs buildings, Bway. To exceed $2,500,000. E. L. Litchfield, 578 Madison Ave., New York, archt. Gander, Gander & Gander, 17 Steuben St., Albany, assoc. archts. Noted July 2.

N. Y., Hempstead—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Tooker & Marsh, 101 Park Ave., New York, U. S. Post Office.

Pa., Phila—CUSTOM HOUSE, etc.—Treas. Dpt. at office Sup. Archt., plans by Ritter & Shay, Packard Bldg., custom house, appraisers store and office, 312,000 sq.ft. floor space, 2nd and Market Sts. $4,000,000.

Tex., Beaumont—POST OFFICE—Treas. Dpt. at office Sup. Archt., 3 story, basement, fireproof U. S. Post Office, $680,000.

Tex., Fort Sam Houston—QUARTERS—Con. Q. M., 13 field officers quarters, 117 company officers quarters, station hospital, quartermaster warehouses, barracks, shops, theatre, stables, picket line sheds, gun sheds, post prison, post headquarters, bakery, motor pool, hay sheds, streets lighting system, paving, $15,000,000.

Utah, Ogden — FORESTRY BUILDING — Treas. Dpt. at office Sup. Archt., sketches U. S. Forestry Building. $300,000.

Wyo., Cheyenne — FEDERAL BUILDING — Treas. Dpt. at office Sup. Archt., federal building.

BIDS ASKED

Ark., Hot Springs—HOSPITAL—Sept. 10, by Con. Q.M. excavating, filling, grading, concrete, stone, plumbing, found. for Army and Navy General Hospital; adv. E. N.-R. Aug. 20. Noted Jan. 22.

California—ROAD—Aug. 27, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 12.45 mi. Sect. C, Route 77, Mount Shasta-Mount Lassen Natl. Forest Hy., Siskiyou Co.

Calif., Richmond—DREDGING—Sept. 11, by U. S. Eng., Custom House, San Francsico, 855,680 cu.yd. from Richmond Harbor. Noted Aug. 13.

Calif., Sunnyvale—HANGAR—Spec. 6631—Sept. 23, by Yards & Docks, Navy Dpt., airship hangar, at Naval Air Station, $1,500,000; adv. E. N.-R. Aug. 20.

Calif., Sunnyvale—HANGAR—Spec. 6632—Sept. 23, by Yards & Docks, Navy Dpt., grading, found. for 310 x 1,138 ft. hangar; adv. E. N.-R. Aug. 20. Noted Aug. 13.

Conn., Hartford—POST OFFICE—Sept. 10, by Treas. Dpt. at office Sup. Archt., 3 story, 200 x 300 ft., brick, stone, Church, Allen and Huntley Sts. $1,200,000. Malmfeldt, Adams & Prentice, 15 Lewis St., archts. Noted Sept. 25.

Conn., Hartford — RECREATION BUILDING —Sept. 8, by Vet. Bu., Arlington Building, recreation building, officers quarters, etc., at U. S. Veterans Hospital.

Conn., New Haven—DREDGING—Aug. 21, by U. S. Eng., Providence, R. I., 150,000 cu.yd. material from Bowery St. Channel. $25,000. Noted May 28.

Conn., New Haven—DREDGING—Aug. 21, by U. S. Eng., Providence, R. I., approximately 137,000 cu.yd. material in New Haven Harbor.

D. C., Wash.—EXCAVATION, etc.—Aug. 27, by Treas. Dpt. at office Sup. Archt., excavations, founds. for U. S. Dpt. Labor and Interstate Commerce Buildings.

D. C., Wash.—HOUSE WALKS, etc.—Sept. 17, office D. Lynn, archt. of Capitol house, walks, installing underground sprinkler system, street lighting system, etc. Squares 576 and 578 in connection with U. S. Botanic Garden; adv. E. N.-R. Aug. 20.

D. C., Wash.—SENATE OFFICE—Sept. 16, at office Super. Archt. of Capitol, new wing along 1st. St., connecting 2 wings of existing U. S. Senate Office Building. D. Lynn, archt of capitol; adv. E. N.-R. Aug. 20. Noted July 16.

Florida — DREDGING — Aug. 27, by U. S. Eng., Jacksonville, 4,000 cu.yd. from 7 shoal areas and removing 15 obstructions consisting of snags, logs, stumps and overhanging trees, from Oklawaha River.

Ky., Lexington—RECREATION BUILDING—Sept. 8, by Vet. Bu., Arlington Bldg., recreation building, officers quarters, at U. S. Veterans Hospital.

Idaho, Boise—INFIRMARY—Aug. 26, by U. S. Property & Disbursing Officer for Idaho, infirmary building and rifle range, moving buildings, sheds and relocation water lines, at Boise Barracks.

Ill., Cairo—REVETMENT—Aug. 26, by U. S. Eng., 428 Customhouse, St. Louis, Mo., 1,000 to 2,250 lin.ft. revetment in Mississippi River, between Miles 7 and 11 mi. above here; adv. E. N.-R. Aug. 20.

Ill., Chicago — DWELLINGS — Sept. 1, by Superintendent Lighthouses, 424 Post Office Bldg., Milwaukee, Wis., 2 independent dwellings of like construction, each a duplex, brick or stucco, for housing keepers of Chicago Light Station, foot Illinois St. at River, near Navy Pier; adv. E. N.-R. Aug. 20.

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La., New Orleans—EARTHWORK—Sept. 8, by U. S. Eng. Office, Prytania St., 3,495,000 cu.yd. earthwork in 2nd New Orleans Levee Dist.

Me., Portland—DREDGING—Sept. 1, at U. S. Eng. Office, Custom House, Boston, Mass., dredging in Back Cove, Portland Harbor; adv. E. N.-R. Aug. 20.

Maryland—DREDGING—Aug. 25, by U. S. Eng., Wilmington, Del., 95,000 cu.yd. Chesapeake City Harbor in Chesapeake and Delaware Canal; adv. E. N.-R. Aug. 20.

Md., Baltimore—DREDGING—Sept. 3, by U. S. Eng., 300 Custom House, 1,050,600 cu.yd. entrance to Craighill Sect. of channel; adv. E. N.-R. Aug. 20.

Michigan—DREDGING—Sept. 15, by U. S. Eng. Office, Detroit, Round Island Shoal 2, St. Mary's River; adv. E. N.-R. Aug. 20.

Miss., Biloxi—DREDGING—See "Contracts Awarded."

Missouri—PILE DIKES—Aug. 22, by U. S. Eng., Kansas City, 7,500 lin. ft. standard pile clump dikes and 19,000 lin. ft. standard revetment in Missouri River at Little Missouri and Glasgow Bends. Noted Aug. 6.

Mo., Caruthersville—POST OFFICE—Sept. 4, by Treas. Dpt. at office Sup Archt., U. S. Post Office. Noted May 7.

Neb., Lincoln—HOSPITAL—Sept. 8, by Vet. Bu., Arlington Bldg., recreation building, officers quarters, at U. S. Veterans Hospital. Noted June 18.

N. J., Fort Monmouth—GRIT CHAMBER—Sept. 2, at office Con. Q.M., grit chamber, sludge pump pit, sludge drying bed.

N. J., Newark—POST OFFICE, etc.—Aug. 25, by Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office, Court House. Noted July 2.

N. Y., Brooklyn—CABLE—Sept. 2, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., cable.

N. Y., Brooklyn—RING and WIRE, etc.—Aug. 28, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., ring, wire.

N. C., Mount Olive—POST OFFICE—Sept. 9, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. Aug. 20.

N. C., Rutherfordton—POST OFFICE—Sept. 2, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Ore., Shoshone—EARTHWORK—Sept. 16, by Dpt. Interior, Bureau Reclamation, Burley, Idaho, earthwork, structures, Miner-Gooding Canal, and North Gooding Canal enlargement on Oregon Short Line R.R., near here.

R. I., Pawtucket—POST OFFICE—Sept. 8, by Treas. Dpt. at office Sup. Archt., constructing U. S. Post Office (except elevators); adv. E. N.-R. Aug. 20.

S. D., Milbank—POST OFFICE—Sept. 14, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Tex., Randolph Field—FUELING SYSTEM—Aug. 26 (extended date), by Con. Q.M., installing gasoline fuel system, incl. pipe, fittings. Noted July 30.

Tex., Randolph Field—KITCHEN EQUIPMENT—Sept. 1, at office Con. Q.M., installing kitchen equipment in cadet barracks; adv. E. N.-R. Aug. 20.

Utah, Ogden—SUPPLY DEPOT—Sept. 4, by Pub. Rds., equipment depot. $75,000. Noted June 11.

Va., Langley Field—DRAINAGE SYSTEM—Sept. 8, by Con. Q.M. Langley Field, storm water drainage system for hangar and barracks areas; adv. E. N.-R. Aug. 20.

Va., Yorkstown — SEWAGE DISPOSAL SYSTEMS, etc.—Aug. 24, by O. G. Taylor, engr. in charge, Colonial National Monument, Natl. Park Serv., Dpt. Interior, 4 small sewage disposal systems, 6 comfort stations.

Wash., Colfax—POST OFFICE—Sept. 24, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. Aug. 20.

CONTRACTS AWARDED

California—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 1.226 mi. Sect. A, Route 68, Mill Creek Natl. Forest Hy., San Bernardino Co., to Crook & Henno, Angelus Hotel, Los Angeles, $102,975. Noted July 2.

California—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 6.139 mi. Sect. C, Route 47, Oakhurst Natl. Forest Hy., Madera Co., to J. G. Donovan & Son, 4031 Goodwin Ave., Los Angeles, $131,977. Noted July 9.

Calif., Stockton—DREDGING—U. S. Eng. Office, 1,435,000 cu.yd. Stockton Channel, to Frank Contg. Co., San Francisco, $139,243.

Colo., Montrose—POST OFFICE—Treas. Dpt. at office Sup Archt., U. S. Post Office, to W. M. Donald Constr. Co., 3408 Thomas St., St. Louis, Mo., $128,000. Noted June 18.

Fla., Miami—POST OFFICE—Treas. Dpt. at office Sup. Archt., founds. and excavations for U. S. Post Office, to A. Blair, 1st Natl. Bank Bldg., Montgomery, Ala., $35,985. Noted June 11.

Ga., Augusta—QUARTERS—Vet. Bu., Arlington Bldg., officers duplex quarters, to Batson-Cook, West Point, $35,368. Noted June 25.

Ga., Eatonton—POST OFFICE—Treas. Dpt. at office Supt. Archt., U. S. Post Office, to Grahn Constr. Co., Red Rock Bldg., Atlanta, $32,986. Noted July 16.

Ia., Sioux City—PILING DIKES—U. S. Eng., 611 Insurance Bldg., 3,000 ft. dikes in Missouri River, to Bilhorn, Bowers & Peters, Railway Exch. Bldg., St. Louis, Mo., $52,000. Est. $60,000. Noted July 30.

Mass., Boston—PIERS—Superintendent Lighthouses, Boston, reconstructing North Pier and repairing South Pier, to W. R. Farrell, 57 Long Wharf, $28,470.

Mass., Camp Devons—ELECTRIC DISTRIBUTION SYSTEM—Con. Q.M., connecting, completing electrical distribution system, to Harrison-Wright Co., Charlotte, N. C., $16,900. Noted July 9.

Michigan—DREDGING—U. S. Eng., Detroit, dredging 3,219,000 cu.yd. Courses 4 and 5, and 7 and 8, in West Neebish Channel, St. Mary's River, to Great Lakes Dredge & Dock Co., 104 South Michigan Ave., Chicago, Ill., at $0.10 per cu.yd., total $321,900. Noted May 14.

Michigan—DREDGING—U. S. Eng., Detroit, dredging 63,050 cu.yd. in Black River, Port Huron, to Great Lakes Dredge & Dock Co., 104 South Michigan Ave., Chicago, Ill., at $0.2874 per cu.yd., total $18,121. Noted June 18.

Mich., Camp Custer — ADMINISTRATION BUILDING, etc.—Vet. Bu., Arlington Bldg., 3 story, basement, brick, steel, rein.-con. administration building, altering recreation and dining hall at hospital, to O. F. Miller Co., Kalamazoo. $150,000. Noted June 18.

Mich., Harbor Beach—BREAKWATER—U. S. Eng., Detroit, repairing breakwater, to Lyons Constr. Co., Mackinaw City, $25,530.

Miss., Biloxi—DREDGING—U. S. Eng., Mobile, Ala., 1,070,000 cu.yd. in Mississippi Sound, Bay of Biloxi, by government plant and hired labor. Noted June 11.

Missouri—REVETMENT — U. S. Eng., St. Louis, 2,500 lin. ft., revetment on Mississippi River between Burnham Island and Commercial Point and 2,500 lin. ft. at Osborne Field, to Woods Bros. Constr. Co., 133 South 13th St., Lincoln, Neb., $80,188.

Mo., Jefferson Barracks—QUARTERS—Con. Q.M., 2 story, 30 x 43 ft., non-commissioned officers quarters, to J. A. Moraw & Ownes Co., 144 West 17th St., Chicago, Ill., $10,423.

Nev., Boulder City—EMPLOYEES' BUILDING—Bureau Reclamation, six 4 room and six 3 room residences, hollow brick walls, concrete found., to L. J. Bowers, Salt Lake City, Utah. $18,916. Noted July 9.

Nev., Las Vegas—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Plains Constr. Co., Tampa, Tex., $237,000. Noted June 25.

N. Y., New York—TEST BORINGS—U. S. Eng. Office, 39 Whitehall St., 200 test borings along center line of proposed New York Bay-Delaware River Section Intracoastal Waterway, to P. J. Healey, Inc., 25 Church St., $25,150. Noted July 30.

N. D., Pembina—CUSTOM HOUSE—Treas. Dpt. at office Sup. Archt., general contract 2 story, 56 x 143 ft., rein.-con., brick, to F. A. Carlson & Co., 618 Lyceum Bldg., Duluth, Minn. Est. $70,000.

Oregon—DIKES—U. S. Eng., Portland, 2,530 lin.ft. pile dikes, to Gilpin Constr. Co., Worcester Bldg., Portland, $12,263.

S. D., Portal—INSPECTION STATION—Treas. Dpt. at office Sup. Archt., inspection station, to Meinecke Johnson Co., Fargo, N. D., $65,445.

Va., Portsmouth—TRACK—Yards & Docks, Navy Dpt., 3,000 ft. track, to Tunstall-Johnson, Citizens Bank Bldg., Norfolk, $32,000.

Washington — ROAD — Pub. Rds., Portland, Ore., grading Mount Rainier Natl. Park, Stevens Canyon Hy., to Holmberg & Norman, Inc., Port Angeles, $155,665.

Wash., Seattle—ELEVATORS—Treas. Dpt. at office Sup. Archt., elevators for federal building, to Otis Elevator Co., 2200 4th St., $120,739. Noted Aug. 8.

Wyoming—ROAD—Pub. Rds., Denver, Colo., grading, draining 14.25 mi. by, between Mammoth Hot Springs and Tower Falls, Yellowstone Park, to S. J. Groves & Sons Co., 529 South 7th St., Minneapolis, Minn., $317,242. Noted July 9.

SUB-CONTRACTS ASKED

Taffany Engineering Contracting Co., 99 Mamaroneck Ave., White Plains, N. Y., is bidding on general contract for 16 two story, brick buildings for the U. S. Government at West Point, bids Aug. 27. This company invites bids before Aug. 26, on the brick work, steam heating, plumbing, nad plastering. Plans and specifications at above address.

RAILWAYS

PROPOSED WORK

Kansas—C. C. Briggs, Westgate Hotel, Kansas City, W. Sacks, Title Guaranty Bldg., St. Louis, Mo. and G. Harmon, Valley Falls, applied to Kansas Public Service Comn., for permit to reconstruct Kansas City Western Ry. from Kansas City through Bethel, Tonganoxie, McLouth, Oskaloosa and Valley Falls, incl. grading, tracks, new poles for electric lines.

New Jersey and Pennsylvania—Finance Com. of Delaware River Joint Comn., Camden, N. J., high speed electric line over Delaware River Bridge, connecting with Philadelphia Subway-Elevated System. $10,000,000. J. K. Costello, genl. mgr. and secy.

Railways (Continued)

BIDS ASKED

Colorado—Denver & Rio Grande Western R.R. Co., Equitable Bldg., Denver, A. O. Ridgway, ch. engr., bids about Sept. 1, constructing 42 mi. Dotsero Cut-Off between Orestod and Dotsero. $3,500,000. Awaiting permit.

CONTRACTS AWARDED

Missouri—See "Bridges, under St. Louis."

Oklahoma—H. W. Wagner, ch. engr. (Eastern Lines), Atchison, Topeka & Santa Fe R.R. Co., Topeka, Kan., track elevation work, incl. 11 subways and retaining walls, in Oklahoma City, to T. A. Allen Constr. Co., 108 West 6th St., Los Angeles, Calif. $1,500,000. Est. $2,000,000. Noted July 23.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Los Angeles—City Council, 8 pedestrian subways, each to have clear inside dimensions of 6 ft. wide by 7 ft. 3 in. high, 10 in. walls and 10 in. top slab. M. Butler, city bridge engr.

GRADE CROSSINGS

PROPOSED WORK

N. Y., Brighton—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, bids probably in fall eliminating Butts crossing on Adirondack Div., Franklin Co. $50,000.

N. Y., Chateaugay—Rutland R.R. Co., L. G. Morphy, ch. engr., Rutland, Vt., soon takes bids reconstructing bridge carrying railroad over Chateaguay-Clinton County Line Hy., Franklin Co. $84,100.

N. Y., Corning—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, reconstructing hy. bridge, approaches to carry State St. over tracks, Steuben Co. $194,000. **Maturity probably in January or later.**

N. Y., Harrisville — New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, bids in fall, eliminating State Street Crossing, Lewis Co. $32,200. Noted Jan. 9.

N. Y., Hornell—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave. S. W., Cleveland, O., bids in fall eliminating crossings of Main, Washing and Steuben Sts. $398,900.

N. Y., Jamestown — Erie R.R. Co., G. F. Fanning, ch. engr., 101 Prospect Ave. S. W., Cleveland, O., eliminating overcrossing from Fairmont Ave. at West 6th St. to Livingston Ave., $197,700; constructing pedestrian tunnel at crossing, $25,500. **Maturity indefinite.**

N. Y., Plattsburg—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, soon takes bids eliminating Wing Crossing 2¼ mi. south of here. $209,200. Owner will do certain work by day labor in connection with above, $78,920. Noted Oct. 31, 1929.

BIDS ASKED

N. Y., New Castle—Sept. 4, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, overcrossing at King St., Chappaqua, J. Downer, Bronxville, ch. engr.; adv. E. N.-R. Aug. 20.

Wisconsin—Aug. 25, by State Hy. Comn. and Hy. Coms. Milwaukee, Racine, Sheboygan and LaCrosse Counties, State Capitol Bldg., Madison, constructing Burlington Grade Separation, Racine Co.; Cedar Grove Grade Separation, Sheboygan Co.; Fonda Grade Separation and Ryan Grade Separation, Milwaukee Co.; concrete surfacing 5.147 mi. Milwaukee-Chicago Rd., Milwaukee and Racine Counties; grading (approaches only), 0.71 mi. Monegan Overhead, LaCrosse Co.

CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, undergrade crossing under tracks Southern Pacific R.R., 9.5 mi. west of El Rio, Ventura Co., to Merritt-Chapman & Scott Corp., 720 Wilmington Blvd., San Pedro, $71,506.

Mass., Boston—City, Dpt. P. Wks., underpass under traffic circle at Charles and Cambridge Sts., to J. A. Singariela, Park Sq. Bldg., $46,731. Noted Mar. 26.

N. Y., Afton—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, eliminating Maple St. Crossing, to F. H. Clement & Co., Bethlehem, Pa., $71,757. Noted July 2.

N. Y., Avon—Erie R.R. Co., G. F. Fanning, ch. engr., 101 Prospect Ave. S. W., Cleveland, O., eliminating Millers Crossing on Lakeville-East Avon Hy., 2 mi. north Lakeville Station, to Bates & Rogers Constr. Co., Engineers Natl. Bank Bldg., Cleveland, O., $35,392. Est. $58,143. Noted July 9.

N. Y., Hillburn — Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave. S. W., Cleveland, O., eliminating grade crossing on Suffern Village-Hillburn Village State Hy., to Senior & Palmer, 50 Church St., New York, $97,533. Noted July 2.

DAMS

PROPOSED WORK

Pa., Towanda—See "Waterworks."

BIDS ASKED

Pa., Ridgway—Sept. 8, by G. F. Greiner, boro secy., Ridgway Natl. Bank Bldg., Contr. 1, earth fill dam, appurtenances; Contr. 2, steel core wall for dam; adv. E. N.-R. Aug. 20.

CONTRACTS AWARDED

N. C., Chapel Hill—University of North Carolina, gravity section concrete dam, 6,300 cu.yd. concrete, 2,000 cu.yd. earth and 1,400 cu.yd. rock excav., to T. C. Thompson & Bro. Co., Chapel Hill, est. $100,000.

PIERS AND WHARVES

BIDS ASKED

R. I., Providence—WHARF PIER and SHED —State of Rhode Island Harbor Comn., State House, taking bids wharf pier and pier shed, incl. plumbing, heating, Allen Ave. Private plans.

AIRPORTS

PROPOSED WORK

Mass., Boston — Commonwealth of Massachusetts, National Guard, plans by C. F. Springall, 50 Park St., Malden, 1 and 2 story, 180 x 200 ft., brick, steel air corps building, incl. control hangar, engine shops, garages, offices, Porter St., East Boston. $250,000.

BIDS ASKED

Tex., Beaumont—City, R. C. Black, engr., bids about Aug. 26, runways, hard roads and shop building for municipal airport. $50,000. Noted Jan. 8.

GRAIN ELEVATORS

PROPOSED WORK

N. Y., Albany—GRAIN ELEVATOR—Albany Port Dist. Comn., c/o P. G. TenEyck, bids in September, grain elevator. $1,500,000. MacDonald Spencer Eng. Co., 420 Lexington Ave., New York, and Chicago, Ill., engrs. and archts.

POWER AND LIGHTING

PROPOSED WORK

Ill., Pecatonica — Pecatonica Electric Co. granted franchise gas distribution system, incl. trunk line connecting with high pressure line of Central Illinois Electric & Gas Company 1½ mi. south of here and distribution lines in city.

Okla., Shawnee—Western Serv. Corp., Braniff Bldg., Oklahoma City, E. R. Ernsberger, pres., granted franchise natural gas distribution system. $450,000. Private plans.

Tex., Columbus—Central Power & Light Co., c/o E. B. Neiswanger, Alamo Natl. Bank Bldg., San Antonio, large hydro-electric development on Colorado River, near here, $5,000,000. Project in abeyance until present power plant (now under construction) is completed. Private plans. Noted Aug. 12.

BIDS ASKED

New York—Sept. 1, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, electric lighting system on 9.72 mi. Bronx Parkway extension from Croton Lake to Bear Mountain Bridge Rd., Contr. 372, J. Downer, ch engr.; adv. E. N.-R. Aug. 20.

Va., Yorktown—Aug. 26, by O. G. Taylor, engr. in charge, Colonial Natl. Monument, complete installation lighting system for Yorktown Sesquicentennial Celebration, and removing system after celebration.

CONTRACTS AWARDED

Calif., Huntington Park — See "Streets and Roads."

Calif., Los Angeles—See "Streets and Roads."

Calif., Los Angeles—City Council, ornamental street lighting system with underground system in Malcolm Ave., to Electric Lighting Supply Co., 214 West 3rd St., $58,227.

N. Y., New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing power equipment for Concourse Line of Independent City-Owned R.R., Manhattan and Bronx Boros, to General Electric Co., 120 Bway., $1,643,558. Noted June 25.

Pa., Phila.—Dpt. City Transit, City Hall Annex, C. E. Myers, dir., electric lighting system on Market Street Pedestrian Concourse, and south side 12th St., Market St. Subway, Contr. 249, to W. V. Paughborne & Co., 1923 West Montgomery Ave., $769. Noted Aug. 6.

PARKS AND SPORTS

PROPOSED WORK

Calif., Redwood City—Fair Oaks Racing & Polo Club, c/o G. Normile, St. Francis Hotel, San Francisco, denied permit to build club house, administration building, racing course, grand stand, other structures in un-corporated area, $1,000,000. W. Polk Co., 277 Pine St., San Francisco, archt. Noted June 4.

N. J., Hilldale—H. Jaeger, rein-con. tile swimming pool, at Cedar Lane and Piermont Ave, $25,000. **Maturity probably soon.** Engineer not appointed.

N. Y., Port Richmond—Dpt. Parks, Municipal Bldg., St. George, 1 story, brick, concrete swimming pool bath house, $90,000. Sibley & Fetherson, 205 East 42nd St., New York, archts.

Pa., Coraopolis—Boro plans 75x200 ft. concrete swimming pool, bath house $42,000. Edeburn Cooper & Co., Law & Finance Bldg., Pittsburgh, engrs. **Maturity in fall.**

Tenn., Nashville—See "Schools."

Tex., San Antonio—State creating park around the Alamo. $150,000 appropriated. H. E. Kincaid, city engr.

BIDS ASKED

Calif., Los Angeles—See "Schools."

Ind., Evansville — Bd. City Comrs., bids about Sept. 1, remodeling coliseum building, incl. new stage equipment, new seating, acoustical treatment, heating, plumbing, electric wiring. $150,000. F. E. Fowler, 505 Central Union Bldg., archt.

Tenn., Knoxville—See "Schools."

CONTRACTS AWARDED

La., Baton Rouge—See "Schools."

Mass., Beverly—City Park Dpt., concrete bleachers, high school field, to J. F. Hurlburt, 82 River St., Beverly. Est. $25,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, grading playground P. S. 121, to Gagliardo Constr. Co., $10,900.

N. Y., New York—Bd. Educ., 500 Park Ave., improving playgrounds at P. S. 56, Bronx Boro, and P. S. 93, Manhattan Boro, to A. Di Geronimo, 1974 East 1st St., Brooklyn, $7,200 and $36,300 respectively.

N. Y., Rockaway—Park Bd., W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, New York, will award contract upon receiving increased appropriation bathing pavilion Jacob Riis Park, to Robert J. Murphy, 242 West 135th St., New York, $364,000. Noted July 9.

HEATING AND VENTILATING

BIDS ASKED

N. Y., New York—Aug. 25, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., installing complete heating system in reconstruction of premises 419-20 East 181st St.

CONTRACTS AWARDED

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, heating P.S. 228, to Dierks Heating Co., 208 East 31st St., New York $34,897, plumbing, to J. A. Graf, 111 Putnam Ave., $22,873; heating P. S. 229, to D. J. Rice, Inc., 41-50 38th St., Long Island City $54,770, plumbing, to J. Egan Co., Inc., $16,000, electrical work for P. S. 229 and 228, to J. G. Hellman, 157 West 165th St., New York, $12,800 and $12,850 respectively. Grand total $154,190. Noted July 2.

N. Y., Queensboro Hill—Bd. Educ., 500 Park Ave., heating P. S. 120, to D. J. Rice, Inc., 41-50 38th St., Long Island City, $53,200; plumbing, to W. J. Endres, Inc., Grand Central Terminal, New York, $18,220; electrical work to Moore Eng. & Contg. Co., 230 Park Ave., New York, $12,200. Grand total $83,620. Noted July 7.

UNCLASSIFIED

PROPOSED WORK

N. Y., New York—ALTERATIONS—A. L. Berman, 1133 Bway., plans by A. L. Simberg, 1133 Bway., altering apartments, incl. incinerator, steam heating, plumbing, 25 West 106th St. To exceed $25,000.

N. Y., New York — ALTERATIONS — One West 67th Street, Inc., c/o S. A. Hertz, archt., 15 West 38th St., altering apartment, incl. plumbing, sprinkler system, 20 West 68th St. $40,000.

N. Y., New York—ELEVATOR EQUIPMENT ALTERATIONS—Five Hundred Seventy-three First Ave. Corp., 575 1st Ave., plans by R. Shulkind, 147 4th Ave., altering elevator equipment in cold storage and meat packing plant, 575 1st Ave. To exceed $25,000.

Oklahoma—GAS PIPE LINE—Western Service Corp., Braniff Bldg., Oklahoma City, 32 mi. 8 in. gas pipe line from Oklahoma City to Shawnee. $200,000. E. R. Ernsberger, c/o owner, pres.

Tex., Viola—OIL REFINERY—Houston Oil Co., Petroleum Bldg., Houston, postponed indefinitely oil refinery plant. $250,000. Company Eng. Dept., Houston, engrs.

BIDS ASKED

N. J., Sea Girt—BOARDWALK—Sept. 1, by City Council, 3,545 lin.ft. boardwalk. Sinceerbeaux, Moore & Shinn, Mechanics Bldg., Trenton, engrs. Noted June 4.

CONTRACTS AWARDED

N. Y., New York—BORINGS—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., additional borings along Route 101, 6th Ave., 9th to 33rd Sts., Manhattan Boro, Agreement "KY," to P. J. Healy, Inc., 25 Church St., $1,077. Noted July 30.

Texas—OIL PIPE LINE—Texas Co., 720 San Jacinto St., Houston, laying 110 mi. 10 in. pipe line from Longview to Port Arthur, to Gregg Constr. Co., Longview. Est. $1,500,000. Noted Apr. 16.

Texas—PIPE LINE—Texas Empire Pipe Line Co., N. E. Hull, in charge, Houston, controlled by Texas Petroleum Corp., 135 East 42nd St., New York, and Cities Service Co., 66 Wall St., New York, 15,500 tons 2 in. pipe for 207 mi. pipe line from Gladewater to Port Arthur, to Republic Steel Co., Youngstown, O.; 10,000 tons, to National Tube Co., 71 Bway., New York. Est. $3,000,000.

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MATERIALS

BIDS ASKED

GATE VALVES—**Los Angeles, Calif.**—Aug. 28, by T. Oughton, city purch. agt., twelve 24 in. square bottom type and two 48 in. round bottom type flanged end, parallelled seat, double disc, non-rising stem gate valves without by-pass, Spec. 2577.

GRANITE PAVING BLOCKS—**New York, N. Y.**—Aug. 21, by P. J. Dooling, comr. Purchase, Municipal Bldg., granite paving blocks to Dpt. Plant & Structures.

PIPE, etc.—**Howard, R. I.**—Sept. 1, by State Purchasing Agent, Pub. Welfare Comn., Providence, bell and spigot c.i. pipe, fittings.

CONTRACTS AWARDED

PIPE—**Arcadia, Calif.**—City Council, furnishing trenchside 3,400 ft. 8 in. c.i. pipe, to Central Fdry., 214 North Alameda St., Los Angeles, at $0.785 per ft.

BRIDGE PLANKS and PILING — **Fairfield, Ia.**—Jefferson Co., 209,800 ft. full sawn fir rough bridge plank, 95,667 ft. full sawn rough pressesure treated creosoted bridge plank, 3,700 ft. pressure treated creosoted piling, to Morris Lumber Co., Eugene, Ore., $13,081. Noted July 30.

CAST IRON WATER PIPE — **Southampton, Mass.**—Bd. Water Comrs., 32,700 ft. 6 and 8 in. c.i. water pipe, to R. D. Wood & Co., 400 Chestnut St., Phila., Pa., at $0.4375 and $0.605 per ft. respectively. Noted Aug. 6, under "Waterworks."

ASPHALT PLANKING, etc.—**Minneapolis, Minn.**—F. S. Gram, city purch. agt., 3,330 sq.yd. asphalt planking 2 x 8, to Cowin & Co., 940 East Hennepin Ave., at $1.745 per sq.yd.; 2,144 each of 2 kinds rail filler purchase made by Minneapolis Street Ry. Co. Noted July 9.

WATERPIPE—**Minneapolis, Minn.** — F. S. Gram, city purch. agt., 1,980 lin.ft. 12 in. c.i. main, to R. D. Wood & Co., 400 Chestnut St., Phila., Pa., at $1.513 per ft. Noted June 29.

PIPE, CASTINGS, etc.—**Fox Point, Wis.**—Village Bd., to R. D. Wood & Co., 400 Chestnut St., Phila., Pa., 1,091 tons 6- to 12-in. c.i. pipe at $36.75 per ton, 245 tons specials $90, hydrants at $50 each; to Municipal Foundries, West Allis, one hundred twenty-three 6 in. valves at $15.50, fourteen 8 in. $28, five 12 in. $50; to M. M. Christensen, St. Paul, Minn., laying 45,387 ft. 6- to 12-in. mains, $17,358. Noted July 29.

EQUIPMENT

PROPOSED WORK

ROAD ROLLER—**Glen Rock, N. J.**—Bd. Boro Council, Boro Hall, purchasing 1 road roller for maintaining roads. $5,000. **Maturity soon.** F. M. Evans, 36 Birched Rd., boro engr.

BIDS ASKED

TRUCKS, PLOWS, TRACTORS, etc.—**Indiana**—Aug. 26, by J. J. Brown, dir. State Hy. Comn., Indianapolis, fifteen to thirty-five 2½ to 3½ ton trucks, sixty to one hundred 1½ ton trucks, two to ten 4 wheel tractors, one to five 5 ton crawler type tractors, 4 to 10 road maintainers, 10 to 25 truck spring blade maintainers, six to fifteen 5 ton three-wheel rollers, 6 to 10 automobiles, 3 to 6 automobiles with pick-up bodies, 30 to 50 light single-blade snow plows, 8 to 20 heavy single-blade snow plows, 10 to 10 heavy V-type snow plows, 1 to 6 rotary snow plows, 10 to 20 tar heating kettles, 16 to 30 air compressors, 2 to 10 mud jacks, 1 to 6 tar car heater, eight to twelve 5 to 10 ton trailers.

SLUDGE DEHYDRATING MACHINE—**Chicago, Ill.**—Sept. 10, by J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., sludge dehydrating machine; adv. E. N.R. Aug. 20.

HEATING and POWER PLANT EQUIPMENT — **Cedar Falls, Ia.** — Sept. 8, by Iowa State Bd. Educ., State Capitol Bldg., Des Moines, W. H. Gemmill, secy., equipment for new heating and power plant at State Teachers College.

FIRE APPARATUS, GRADER, ROLLER, etc. —**Sparks, Nev.**—Aug. 24, by W. S. Allen, city clk., triple combination 500 gal. pumper, water tank and hose truck 500 ft. 2½ in. double jacket fire hose; 1½ ton utility truck, chassis, cab and body; 3 yard dump truck, complete with cab, dump, hoist and body; 10 ft. blade leaning wheel grader with scarifier attached; 10 ton four cylinder gas roller; one piece portable rock crushing plant with feeder, feed conveyor, rock crusher, bucket elevator, revolving screen, delivery conveyor, bin of at least 20 yard capacity, jack leg type, entire unit, except bin, to be mounted on chassis; crusher to be not less than 9 x 16 in. and capacity not less than 70 cu-yd. per 8 hp.

POWER HOUSE EQUIPMENT—**Trenton, N. J.**—Dpt. Institution & Agencies, State Office Bldg., taking bids furnishing, installing power house steam piping and equipment at New Jersey State Prison grounds. $5,000 or more. Div. Architecture & Constr., Trenton, engrs.

WATER TREATMENT SYSTEM EQUIPMENT—**Woodbine, N. J.**—Dpt. Institutions & Agencies, State Office Bldg., Trenton, taking bids furnishing, installing water treatment system equipment for power plant at State Colony for Feeble Minded, $5,000 or more. Div. Architecture & Constr., State Office Bldg., Trenton, engrs.

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TRACTOR—**New York, N. Y.**—Aug. 24, by P. J. Dooling, comr. Purchase, Municipal Bldg., crawler tractor with bulldozer for Dpt. Docks.

ROTARY CONVERTOR—**Cleveland, O.**—Aug. 21, by City, rotary convertor with transformer and complete equipment. L. A. Quayle, City Hall, engr.

BOILER, STOKER, CINDER TRAP, etc.—**Howard, R. I.**—Aug. 31, by State Pub. Welfare Comn., State House, Providence, F. J. Farnell, chn., furnishing, installing 500 hp. cross drum water tube boiler, brick setting, underfeed inclined grate multiple retort stoker and cinder trap with butterfly type damper in Central Power Plant.

CONTRACTS AWARDED

SUB-STATION EQUIPMENT—**Chicago, Ill.**—Commonwealth Edison Co., 72 West Adams St., sub-station equipment, transformers, to Allis-Chalmers Mfg. Co., West Allis, Wis. Est. $460,000.

GENERATING EQUIPMENT — **Fergus Falls, Minn.**—Ottertail Power Co., 7,500 kw. turbine generator unit, to Westinghouse Electrical & Mfg. Co., 150 Bway., New York. Est. exceeds $40,000.

ELECTRICAL EQUIPMENT—**New York, N Y.**—Long Island R.R. A. C. Watson, ch. engr., Pennsylvania Sta., New York, electrical equipment rectifiers, to Allis-Chalmers Mfg. Co., West Allis, Wis., and 50 Church St., New York Est. $350,000.

ELECTRICAL EQUIPMENT—**Yonkers, N. Y.**—New York Edison Co., Irving Pl., electrical equipment, transformers, for Millwood Sub-Station, to Allis-Chalmers Mfg. Co., West Allis, Wis., and 50 Church St., New York. Est. $140,000.

FOREIGN

Argentina, Buenos Aires—Ministry of Pub. Wks., soon takes bids with preference to local interests, 640 grain elevators, throughout the agricultural zones. Noted Aug. 6.

Peru, Cerro de Pasco—Cerro de Pasco Copper Co., 44 Wall St., New York, and Cerro de Pasco, Peru, sinking shaft construction, hoist house, by day labor and separate contracts. To exceed $300,000. Hoisting equipment, direct current motor, etc., awarded to Wesitnghouse Electric & Mfg. Co., 150 Bwy., New York, to exceed $40,000.

Union Socialist Soviet Republics — Amtorg Corp., 261 5th Ave., New York, factory cut dwellings for house project for 250,000 workers in Donetz Basin, by technical aid contracts. To exceed $6,000,000.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Mass., Reading—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Reading—Owner, c/o R. W. White, 31 Central Ave., Lynn, 3 story, basement, brick, stone, plain found., Sanborn St., separate contracts. $150,000 or more. B. Porter, 209 Washington St., Boston, archt.

Mo., St. Louis—Owner, general contract 3 story, basement, 33 x 141 x 145 ft., rein.-con., brick, cut stone, Scanlon and Jamieson Aves., to Keithley Constr. Co., 101 Southwest Bank Bldg.

Mo., St. Louis—Premium Realty & Investment Co., S. R. Baer, 6th and Washington Aves., rebuilding 5 story, basement hotel, store recently damaged by fire, incl. general interior alterations, Grand and Olive Sts., to W. H. and N. Cunliff Co., 3327 Lindell Ave.

N. Y., Brooklyn—Hargon Building Corp., H. Gordon, pres., 562 East 92nd St., 2 story, basement, Church Ave. and East 92nd St., separate contracts. $150,000. I. Kallich, 375 Fulton St., archt.

N. Y., Brooklyn—Niklam Holding Corp., H. Malkin, pres., 91 Avenue S., 2 story, Avenue M and East 65th St., separate contracts. $150,000. I. Adelsohn, 44 Court St., archt.

N. Y., Brooklyn—Singein Building Corp., S. Singer, pres., 160 East 53rd St., 6 story, basement, Ocean Ave. and Dorchester Rd., separate contracts. $230,000. Kavy & Kavovitt, 350 Stone Ave., archts.

N. Y., New York—Ardo Realty Corp., c/o H. Cleveland, 2091 Anthony Ave., 5 story, White Plains Ave. and Ardor St., separate contracts. $150,000. C. Schaefer, Jr., 332 East 149th St., archt.

N. Y., New York — S. Cohen and DeWitt Building Corp., 1506 Jerome Ave., 6 story, 124 x 287 ft., Mosholu Parkway and Gunhill Rd., separate contracts. $500,000. G. G. Miller, 545 5th Ave., archt.

N. Y., New York—Corporation, c/o J. M. Levine, 30 East 42nd St., apartment, Knox Pl. and Mosholu Parkway, separate contracts. $150,000. I. L. Crausman, 332 East 149th St., archt.

N. Y., New York — Corporation, c/o D. Rose, 2174 Barnes Ave., 6 story, 75 x 90 ft., Antin Pl., separate contracts. $200,000. R. E. Golden, 2419 Webster Ave., archt.

N. Y., New York—Corporation, c/o B. Silverman, 653 St. Nicholas Ave., 6 story, 55 x 100 ft., Bronxdale and Cruger Aves., separate contracts. $165,000. I. L. Crausman, 332 East 149th St., archt.

N. Y., New York—Five Hundred Twenty-One 5th Ave. Corp., c/o S. Ninskoff, pres., 521 5th Ave., 6 story, Mosholu Parkway and 206th St., separate contracts. $150,000. H. Ginsberg, 205 East 42nd St., archt.

N. Y., New York—L. Jacobson, 261 Bway., 20 story apartment, store, 209 East 334th St., separate contracts. $1,000,000. **Maturity later.**

N. Y., New York—Olmstead Powell Corp., C. W. Hefter, pres., 1148 Olmstead Ave., 6 story, basement, 78 x 81 ft., Olmstead Ave. and Powell Aves., separate contracts. $175,000. J. C. Watson, 340 East 32nd St., archt.

N. Y., New York—Robro Realty Corp., 2174 Barnes Ave., 6 story, 75 x 150 ft., Wallace and Brady Aves., separate contracts. $250,000. R. E. Golden, 2419 Webster Ave., archt.

N. Y., New York—P. Tavolaccia and Fibros Building Corp., 731 East 232nd St., 6 story, basement, brick, steel, Radcliffe Ave., and Margruta St., separate contracts. $155,000.

CLUBS

PROPOSED WORK

N. J., Asbury Park—Y.W.C.A., E. S Klausner, pres., 730 Cookman Ave., will not build 1 story, basement, brick, steel, community centre, gymnasium. $250,000. Project abandoned. Noted July 16.

Mass., Everett — Parlin Associates, c/o A. Jennings, 45 Milk St., plans by Parker, Thomas & Rice, 177 State St., Boston, 2 story, basement, brick, steel Y.M.C.A., dormitory addition, plain found., Webster and Church Sts. $150,000. Noted Aug. 6.

Mass., Newton — Newton Y.M.C.A., 126 Church St., sketches by E. I. Leeds, 216 Tremont St., altering and constructing 2 story, basement, brick addition. $150,000.

Mich., Detroit—Detroit Y.M.C.A., Witherall St., plans by Malcolmson, Higginbotham & Trout, 1217 Griswold St., about 6 story, basement, brick, steel, concrete, known as Lucy Thurman Branch, St. Antoine and Elizabeth Sts. $300,000.

N. J., Garfield—Owner, c/o D. J. Conte, archt., 166 Harrison Ave., 2 story, basement, brick, steel club house. $150,000. Project in abeyance. Noted July 23.

N. J., Ramsey—Fortitude Lodge, W. Schroeder, grand master, will not build 2 story, basement, brick, steel masonic hall, Lake St. and Franklin Turnpike, $150,000. Project abandoned. Noted June 4.

CONTRACTS AWARDED

N. J., Newark—Italian Catholic Union Holding Co., 118 7th Ave., general contract 2 story, basement, 60x100 brick, steel, steel club house, to J. Illaria, 215 Ampere Parkway, Bloomfield, est $150,000. Noted Aug. 6.

HOSPITALS

PROPOSED WORK

Conn., Waterford—Seaside Sanatorium State Tuberculosis Comn., Hartford, plans by Cass Gilbert, 244 Madison Ave., New York, infirmary building, Magonk St. $150,000 or more.

Conn., Willimantic—Windham Co. Memorial Hospital, G. E. Taylor, chn. building com., bids in late fall on revised plans (from selected list of contractors) general contract 3 story, basement hospital, 3 story nurses' home, 2 solariums, power plant and laundry, brick, steel, stone, West Main and Mansfield Sts. $500,000. Crow, Lewis & Wick, 200 5th Ave., New York, archts. C. S. Neergard, 512 5th Ave., New York, engr. Noted May 28.

Ill., Alton—Alton State Hospital, J. C. Stewart, mgr., sketches wards for tuberculosis patients, nurses' home, granery, field cottage, kitchen addition. $325,000. Private plans.

Mass., Boston—City Hospital Dpt., plans by J. H. Ritchie & Sons, 250 Stuart St., 2 and 3 story, basement, brick, steel kitchen, dining room and laundry, plain found., Harrison Ave. $175,000.

Mass., Danvers—Hunt Memorial Hospital plans by G. H. Fanning, 221 Essex St., Salem, altering and constructing 3 story, basement, brick hospital addition. $150,000.

Mass., Lawrence—City, M. A. Landers, mayor, plans by Ashton, Huntress & Alter, 477 Essex St., 2 story, 110 x 115 ft. brick, steel hospital. $150,000.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by Landsman & Smith, 105 West 40th St., 7 story, 84x130 ft. maternity hospital, Welfare Island, opposite 54th St. To exceed $200,000.

Pa., Erie—Bd. Comrs. C. Davis & A. MacLean, comrs., Court House, sketches tuberculosis hospital, probably brick and hollow tile, Gore St. and Pleasant Rd. $300,000. W. H. Supplee, Court House, engr. Architect not appointed.

Pa., Dansville—Dpt. Property & Supplies, Harrisburg, plans by F. A. Rianhart, Williamsport, clinic ward, nurses' home. $430,000.

Tex., Wichita Falls—Wichita State Hospital, Bd. Control, C. Teer, chn., Austin, plans by Voelcker & Dixon, Perkins Snider Bldg., ward building, and by R. C. Arnold, 910 Staley Bldg., hospital. $155,000. Noted July 9.

Hospitals (Continued)

BIDS ASKED

Mass., Dorchester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, taking bids 3 story, basement, brick, stone steel reception building, plain found., at Boston State Hospital. $400,000. Kendall, Taylor & Co., 209 Columbus Ave., Boston, archts. Noted June 4.

N. Y., Jamaica—Aug. 21, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, constructing and completing Building D, Queens General Hospital, 164th St. between Goethals Ave. and Grand Central Parkway, Queens Boro.

N. Y., Staten Island—Aug. 24, by J. G. W. Greeff, comr. Hospitals, Municipal Bldg., New York, general contract Male Pavilions A, B, C and D, New York City Farm Colony, Staten Island. C. B. Meyers, 31 Union Sq. W., New York, archt.

CONTRACTS AWARDED

Conn., Norwich—State, Tuberculosis Comn., 2 cottages, to P. F. Sweeney, Chestnut St., $21,390, brick, steel infirmary, to Pierretti Bros., Centerbrook, $245,418. Noted Aug. 6.

N. J., Preakness—Passaic Co., Court House, Paterson, general contract 3 story, basement, 40x300 ft., brick, steel welfare detention home, to Censullo-Burke Constr. Co., 613 15th St., Union City, $469,000; heating, to G. M. Mitchell & Co., 19th Ave., Paterson, $68,300; elevator, to A. B. See Elevator Co., 52 Vesey St., New York, $10,750; kitchen equipment, to H. Page, 285 Market St., Paterson, $36,620. Grand total $584,670. Noted June 25.

N. Y., Buffalo—Kidd & Kidd, archts., 524 Franklin St., general contract 4 story hospital wing, for Buffalo General Hospital, 524 Franklin St., to C. Everett, Inc., 291 Auburn Ave., $220,000; plumbing, to G. Drake, 218 Lexington Ave., $20,700; heating, to W. S. Shaddock, 295 Oak St., $18,000; electrical work, to McCarthy Bros. & Ford, 75 West Mohawk St., $19,200. Grand total $277,900. Noted July 9.

N. Y., New Dorp (sta. Staten Island)—Seaside Hospital, 3 story, basement, 50 x 150 ft., brick, steel dormitory, to John Anderson Constr. Co., 391 Hoyt Ave., Port Richmond. Est. $200,000. **Maturity latter part September.** Noted May 21.

Okla., Vinita—State Board of Affairs, Capitol Bldg., Oklahoma City, 3 story, basement, 120 x 206 ft., rein.-con., brick ward building, on campus, to Manhattan Constr. Co., 121 West 1st St., Oklahoma City, $128,500. Noted July 26.

CHURCHES

PROPOSED WORK

Minn., St. Paul—Church of Blessed Sacrament, W. W. Finley, pastor, White Bear and LaCrosee Ave., rein.-con., brick, stone church. $150,000.

N. H., Keene—Greek Catholic Parish, c/o H. Bardis, 19 Roxbury St., 1 story, basement church. $125,000-$150,000. Architect not appointed.

N. Y., New York—Church of St. Roch, Wales Ave. near 149th St., bids after Aug. 24, general contract church, rectory, Wales Ave. and 149th St. To exceed $150,000. DePace & Juster, 151 West 46th St., archts. Noted July 30.

CONTRACTS AWARDED

Md., Centreville—Shreve, Lamb & Harmon, archts., 11 East 44th St., New York, 1 story, basement, 67 x 95 ft., brick, stone, rubble stone church, rectory, to John H. Hallahan, Inc., 3116 Market St., Phila., Pa., for Mother of Sorrows Roman Catholic Church. Est. $200,000. Noted July 30.

N. J., Maplewood — Wyoming Presbyterian Church, S. P. Shackelton, 420 Wyoming Ave., 2 story, basement, brick, steel, to Carlson Co., Walnut St., Montclair, est $150,000. Noted July 30.

SCHOOLS

PROSPOSED WORK

Ark., Conway—Arkansas State Teachers College, H. L. McAlister, pres., plans by Wittenborg & Deloney, Home Insurance Bldg., Little Rock, 2 story, basement, rein.-con., brick, vocational building for use Industrial and Agricultural Dpts. $150,000. **Maturity indefinite depending on sale of bonds.** Noted Aug. 14.

Del., Millville—State School Building Comn., H. V. Halloway, supt., Dover, plans by Guilbert & Betelle, 20 Bradford Pl., Newark, N. J., 2 story, basement, brick, steel addition to Lord Baltimore School. $150,000.

Mass., Boston—City Dpt. School Buildings, sketches by H. R. Duffie, 364 Belgrade Ave., Roslindale, 2 story, basement, brick, stone, plain found. Beech St., West Roxbury. $150,000.

Mass., Boston—City of Boston, Dpt. School Buildings, sketches Boys Latin School, Fenway. $1,000,000. Architect not appointed.

Mass., Brighton (sta. Boston)—City of Boston, Dpt. School Buildings, sketches by G. N. Jacobs, 114 State St., Boston, 2 story, basement, brick school, Bertram St. $150,000.

Mass., Brookline—Town, School Building Comn., sketches by Kilham, Hopkins & Greeley, 9 Park St., Boston, 2 story, basement, brick, steel high school addition, physical education unit, Greenough St. $540,000. Noted May 7.

Mass., Chatham—Town, Bd. Selectman, plans by McLaughlin & Burr, 88 Tremont St., Boston, altering and constructing 2 story, basement, brick addition, plain found., Main St. $150,000.

Mass., Marblehead—School Bd, sketches by W. H. Quiner, 75 Pleasant St., 2 story, basement, brick high school, incl. 8 class rooms, auditorium, gymnasium. $150,000 or more. Noted Aug. 6.

Mass., Topsfield—Town, Building Comn., P. Phillips, chn., sketches by Adden, Parker, Clinch & Crimp, 177 State St., Boston, 2 story, basement, brick, stone grade and high school, near Town Hall. $200,000.

Mich., Battle Creek—Bd. Educ. plans by A. Kahn, Inc., 1000 Marquette Bldg., Detroit, 3 and 6 story, basement, brick, steel, stone, rein.-con. high school, auditorium, North McCamly St. $500,000.

N. J., Caldwell—Bd. Educ., Junior High School, plans by C. Willard Wands, 309 Bloomfield Ave., 2 story, basement, brick, steel addition, Central Ave. $150,000.

N. J., Elizabeth—Bd. Educ., 417 South Broad St., 3 story, basement, brick, steel school, athletic field, stadium, Clarkson Ave., Green and Garden Sts. $250,000. H. B. Brady, Inc., 333 North Broad St., archts. **Maturity in September.** Noted July 16.

N. J., Engelwood—Engelwood School for Boys, 35 Dwight Pl., sketches by L. C. Licht., 4 Dean St., new sketches 2 story, basement, brick, steel school, $200,000. Noted July 16.

N. J., Hackensack—Bd. Educ., 355 State St., sketches by A. E. Dore, 15 Main St., and probably takes bids about Sept. 15. School 8, 2 story, basement, brick, steel, 1st Ward. $150,000.

N. J., Little Ferry—Bd. Educ., J. Cronin, pres., 2 story, basement, brick, steel, rein.-con. school, $150,000. Project in abeyance. Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted July 2.

N. J., New Brunswick — School Bd. Educ., Senior High School Addition, will not build 1 and 3 story school. $400,000. Noted Aug. 6.

N. Y., Brooklyn—Christian Bros., c/o T. E. Malloy, bishop, high school for boys, Green, Clermont, Lafayette and Vanderbilt Ave. To exceed $400,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, sketches by C. W. Martin, Flatbush Ave. extension and Concord St., P. S. 212, Flatlands Ave. and East 100th St. $303,800.

N. Y., Brooklyn—Roman Diocese of Brooklyn, c/o H. V. Murphy, archt., 208 Livingston St., altering and constructing school addition, 73rd St. and 15th Ave. $150,000.

N. Y., Whitestone—Bd. Educ., 500 Park Ave., soon takes general contract bids on revised plans P. S. 79, 147th St. and 15th Dr. $346,000. C. W. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt. Noted June 18.

Pa., Dowingtown—Bd. Educ., E. Smedley, secy., plans by J. Mowers, Main and Bridge Sts., Phoenixville, 2 story, basement, 70 x 140 ft. and 50 x 100 ft., rein.-con., brick, steel high school, plain found. $160,000.

Pa., Glenshaw—Bd. Educ., F. C. Koussman, pres., plans by Ingham & Boyd, Empire Bldg., Pittsburgh, 3 story, basement, brick, hollow tile, elementary and high school. $220,000.

R. I., North Kingston—Town, R. Downes, chn. building com., plans by H. A. Lewis, 75 Westminster St., Providence, and soon takes bids Senior High School, 2 story, basement, brick, steel, plain found., Post Rd. and Phillips St. $155,000.

Tenn., Nashville—City Bd. Educ., c/o A. E. Hill, pres., plans by Marr & Holman, Stahlman Bldg., rein.-con., brick, tile, stone, steel high school, athletic stadium. $400,000.

BIDS ASKED

Calif., Los Angeles—University of California, 3551 University Ave., bids about Sept. 1. 1 story, steel, concrete women's and men's gymnasiums, incl. swimming pools, solariums, basket ball courts, on campus. $1,000,000 Allison & Allison, 1005 California Reserve Bldg., and G. W. Kelham, 315 Montgomery St., San Francisco, archts. Noted May 28.

Ky., Louisville—Aug. 28, by S. D. Jones, bus. dir. Bd. Educ., 7th and Chestnut Sts., part 2 and 3 story, irregular sized, rein.-con., brick, steel school, Larchmont and Nevada Aves. $250,000. Warren & Ronald Heating Eng. Co., 1704 Heyburn Bldg., engrs. J. Myrick Cooley, 1814 South 1st St., archt.

Ind., Ft. Wayne—See "Buildings Unclassified."

N. J., Livingston—Bd. Educ., bids about Sept. 15, 2 story, basement, brick, steel, rein.-con. addition to Roosevelt School. $200,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted June 25.

N. J., Montville—Aug. 25, by Bd. Educ., 1 story, basement, brick, steel, Taylortown Rd. $150,000. P. DeGellecke, 122 East 25th St., New York, archt. Noted July 23.

N. J., Montclair—State Bd. Educ., State House Annex, bids about Oct. 1, general contract 2 story, basement, brick, steel addition to Montclair Normal School. $300,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted July 2.

N. J., Newark—Sept. 10, by Bd. Educ., City Hall, Junior and Senior High School, 2 story, basement, brick, steel, Chancellor Ave. $1,080,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted Aug. 12.

N. J., Teaneck—Bd. Educ., High School, sketches by N. T. Anthony, 275 Engle St., Englewood, and probably takes bids about Sept. 15, general contract 2 story, basement, brick, steel school. $200,000.

N. J., Union City—Sept. 22, by Bd. Educ., Washington School, 39th St., general contract 3 story, basement, brick, steel, rein.-con., West St. between 5th and 6th Sts. $750,000. J. Lugosch, 714 Bergenline Ave., archt. Noted Aug. 11.

N. Y., West Brighton—Aug. 25, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., general contract P. S. 45, Morrison Ave. from Lawrence to Davis Aves., for Bd. Educ., 500 Park Ave., New York. Noted Aug. 12.

N. D., Grand Forks—Sept. 1, by Bd. Educ., W. P. Roglie, secy., 2 story, part basement, 120 x 200 ft., rein.-conc., brick, stone school. T. B. Wells, Grand Forks, archt. Noted June 18.

O., Cincinnati—Aug. 31, by Bd. Educ., 511 West Court St., 2 story, basement, 167 x 250 ft., rein.-con., brick, plain found., Bond Hill. $350,000. C. F. Cellarius, St. Paul Bldg., archt. Noted Oct. 30.

O., Springfield—Aug. 21, by Bd. Educ., J. M. Pierce, clk., 3 story, basement, concrete, brick, steel high school. $300,000. Eastman, Budke & Lethley, Springfield, archts.

Ore., Portland—School Bd., Dist. 1, bids about October 1, 3 story, basement, 22 room, brick, steel school. $200,000. G. H. Jones, Portland, archt.

Pa., Arnold—Bd. Educ., C. I. Cotton, pres., taking new bids Junior and Senior High School, 2 story, basement, 61 x 109 ft., brick, steel, rein.-con., Woodmont Ave. and Richmond St. $150,000. Former bids rejected. P. R. L. Hogner, Smithfield Bldg., Pittsburgh, archt. Noted July 30.

Pa., Monaca—Bd. Educ., I. H. Todd, pres., taking bids Junior High School, 2 story, basement, 63 x 166 ft., brick, steel, hollow tile, 11th and Pennsylvania Ave. $150,000. Stetson & Bradley, 719 Franklin Ave., Ahquippa, archts.

Pa., Munhall—Aug. 28, by Bd. Educ., L. J. Holman, pres., Elementary and Junior High School, 1 and 3 story, basement, 143 x 271 ft., brick, limestone, rein.-con., incl. auditorium, gymnasium, Woodlawn Ave. and Charles St. $300,000. Former bids rejected. W. G. Wickerham, 133 East 8th Ave., Homestead, archt. Noted July 23.

Tenn., Knoxville—Aug. 27, by University of Tennessee, S. Johnson, secy., c/o J. J. Walker, South College, Alumni Memorial Physical Education Building and Gymnasium. Barber & McMurry, General Bldg., archts.

Tex., Galveston—Aug. 25, by Bd. Educ., 2 story, brick, tile negro school, 35th and North Sts. $200,000. D. McKenzie, 2107½ E. St., archts. M. Lemmon, Constr. Indus. Bldg., Dallas, assoc. archt. Noted Nov. 20.

Tex., Galveston—Bd. Educ., c/o Secretary, bids about Aug. 20, Junior High School, brick, stone $325,000. Gieseke & Harris, Norwood Bldg., Austin, archt. R. R. Rapp, Guaranty Bldg., assoc. archt. Noted Aug. 6.

CONTRACTS AWARDED

D. C., Wash.—District Comrs., District Bldg., addition to MacFarland Junior High School, to L. Paschall, Amer. Bank Bldg., Richmond, Va. $167,000.

Ind., Brookston—School Comrs. Carroll Co., 70 x 110 ft. brick, steel, stone, to L. E. Wickersham, Logansport. Est. $150,000. Noted July 9.

Ind., Millgrove—School Comrs., general contract 2 story, basement, brick, steel, to H. A. Arbaugh Constr. Co., Portland. Est. $150,000 Noted July 16.

La., Baton Rouge—Louisiana State University and Agriculture Mechanical College, Fine Arts Building, 3 story, basement, stucco, to Caldwell Bros., 816 Howard Ave., New Orleans, $240,000; heating and plumbing systems to American Heating & Plumbing Co., 829 Baronne St., New Orleans, $115,997; electric wiring, conduit, to Hart Enterprise Electrical Co., Inc., 826 Baronne St., New Orleans, $86,513; elevator, to Otis Elevator Co., 852 Carondolet St., New Orleans, $4,296. Grand total $446,806. Noted June 11.

La., Baton Rouge—Louisiana State University and Agricultural & Mechanical College, general contract 3 story, face brick field house and recreation center, to Caldwell Bros., 816 Howard St., New Orleans, $272,000; electrical system, to Baton Rouge Electric & Mac. Wks., Baton Rouge, $36,667; mechanical work, boilers, piping, to W. J. Riley, Monroe, $39,000; Grand total $347,667. Noted June 11.

Me., Waterville—Colby College, F. W. Johnson, pres., preliminary contracts such as test borings, surveys for new college buildings Mayflower Hill, to Hegeman-Harris Co., 360 Madison Ave., New York. Total est. $3,000,000. F. Larsen, Hanover, N. H., assoc. archt. Noted Jan. 29.

Mass., Brighton (sta. Boston)—City of Boston, Dpt. School Buildings, 2 story, basement, brick, limestone, steel intermediate school, plain found., to John Bowen Co., Inc., 127 Newbury St., Boston, $619,800. Noted July 16.

Mass., Mansfield—Town, C. L. Hill, chn. building com., altering and constructing 2 story, basement, brick addition to Junior High School, plain found., to L. M. Witherell, 20 Court St., Taunton. Est. $150,000. Noted July 30.

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Schools (Continued)

N. J., Newark—Our Lady of Mount Carmel Roman Catholic Church, E. D. Aurila, pastor, East Merchant St., general contract, 2 story, basement, brick, steel school addition, Oliver St. between Adams and Van Buren Sts., to Nicholas N. Pannullo, 266 Van Buren St. Est. $150,000. Noted Aug. 13.

N. J., Rutherford—St. Mary's Roman Catholic Church, W. Tichler, pastor, 91 Home Ave., general contract 2 story, basement, 100 x 135 ft., brick, steel, rein.-con. school, to W. H. Fissell Co., 1328 Bway., New York; plumbing, to A. R. Gasewind Co., 1060 Broad St., Newark; heating, to Standard Plumbing & Heating Co., 181 Ellisen St., Paterson; electrical work, to Watson Flagg Eng. Co., 107 10th Ave., Paterson. Est. $200,000. Noted Aug. 12.

N. Y., Auburn—City, City Hall, general contract Senior High School, Franklin St., to Mathew Rauen, 326 West Madison St., Chicago, Ill., $448,200; electrical work, to L. W. Kieswetter, 620 North Salina St., Syracuse, $24,295.

N. Y., College Point—W. C. Martin, archt. and supt., School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general contract P. S. 129, to W. Waters & Co., 1482 Bway., New York, $373,973. Noted June 25.

N. Y., Williamsville—Bd. Educ., general contract 3 story, 97 x 137 ft. high school addition, to A. E. Fidinger, 66 Pfohl Pl., $100,000. Noted May 28.

Vt., Bennington—Bennington College, R. E. Leigh, New York, pres., three 3 story dormitories, and 3 story brick, marble college, to E. J. Pinney, Inc., 220 Dwight St., Springfield, $600,000. Noted July 16.

Wis. Milwaukee—School Bd., excavation and concrete work for Solomon Juneau High School, to T. Stark Constr. Co., 2312 West Wisconsin Ave. $117,810, structural steel, to Worden-Allen Co., Port Washington Rd. $78,765, cement work Steuben Junior High School 3 and 4 story, 200 x 225 ft., to Kroening Constr. Co., 4500 West Mitchell St. $47,958, cut stone, to Andres, Stone & Marble Co., 326 East Keefe Ave. $53,391, roofing, to Universal Roofing Co., Inc., 5402 West State St. $14,975, carpentry work, to J. P. Jansen Co., 3079 North 39th St., $72,000. Grand total $384,899.

Ont., Toronto—Bd. Educ., 155 College St., masonry work for 3 story, basement, brick, steel, stone addition to Danforth Technical School, to Avery Shipp Constr. Co., 2850 Dundas St. W., $104,139; carpentry, to J. R. Page, 18 Toronto St., $17,997; structural steel, to Dominion Bridge Co., 1139 Shaw St., $18,750; plumbing and heating, to H. Griffiths & Co., 1128 College St., $21,750; heat regulation, to Johnson Temperature Regulating Co. of Canada, 100 Adelaide St. W., $2,681; electrical work, to Electrical Maintenance & Repairs Co. Ltd., 25 Brant St., $25,763; plastering, to E. J. Curry, 232 Bleecker St., $13,500; marble and tile, to Italian Mosaic & Tile Co., 250 Madison Ave., $3,056. Grand total $207,636.

Que., Montreal—Roman Catholic School Comn., 113 Ste. Catherine St. W., brick, stone, steel, Berri St., to Dansereau, Ltd., 1387 Bernard St. W., $235,000.

THEATRES

PROPOSED WORK

Mass., Reading—S. Pfau, 62 Hutchins St., Boston, brick, steel theatre, Reading Sq. $150,000 or more. Architect not appointed.

N. J., Trenton—Trenton Theatre Building Co., Trenton, bids after Aug. 18, general contract theatre. To exceed $200,000. T. W. Lamb, Inc., 701 7th Ave., New York, archts. Radio Keith Orpheum, 1564 Bway., New York, lessee. Steel contract awarded, to N. A. K. Bugbee Co., 204 East Hanover St., $14,000.

N. Y., New York—F. H. D. Holding Corp., 309 West 23rd St., bids probably in November, general contracts theatre, store, 261 8th Ave. $800,000. T. W. Lamb, 701 7th Ave., archt. Noted July 30.

N. Y., New York—T. W. Lamb, archt., 701 7th Ave., soon takes bids general contract altering theatre, 254 West 42nd St., for Alurion Realty Corp., 60 Wall St. $500,000. Noted July 30.

N. Y., New York—Melrose Bond & Mortgage Corp., 560 Melrose Ave., P. Murphy, pres., bids after Sept. 15, 2 story theatre, Grand Concourse and Mount Eden Ave. $175,000. E. DeRosa, 560 Melrose Ave., archt. Noted July 30.

BIDS ASKED

Mass., Brookline—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Brookline—Rawson Constr. Co., 27 School St., Boston, 2 story, basement, brick, stone, steel theater, store, plain found., separate contracts. Est. $150,000. Private plans. Noted Aug. 13 Daily.

N. Y., New York—Metropolitan Square Corp., 61 Bway., filed plans for 31 story, 200 x 375 ft. theatre and office, at Radio City, 6th Ave. from 50th to 51st Sts. Todd, Robertson & Todd Eng. Co., 347 Madison Ave., contractors. $7,000,000. Radio Keith Orpheum Corp., 1564 Bway., lessee. Noted Mar. 19.

BANKS

PROPOSED WORK

Ind., Logansport—First Natl. Bank plans by McGuire & Shook, 941 North Meridian St., Indianapolis, remodeling and constructing brick, steel addition. $150,000.

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Kan., Topeka—National Bank of Topeka, C. W. McKean, pres., soon takes bids 14 story (157 ft. high), basement, 75 x 115 ft., concrete, steel, stone bank, office, 6th St. and Kansas Ave. $500,000. T. W. Williamson & Co., 312 Farmers Natl. Bank Bldg., and K. M. Vitzhum & Co., 1 North La Salle St., Chicago, Ill., assoc. archts. Wrecking old building on site, awarded to G. Senne, 1017 Kansas Ave., $1,200. Noted July 2.

N. Y., New York—Bowery Savings Bank, 110 East 42nd St., sketches by York & Sawyer, 110 East 42nd St., altering and constructing bank and office addition, 110 East 42nd St., $650,000.

N. Y., New York—Fifth Avenue Bank of New York, 530 5th Ave., plans by Schultze & Weaver, 18 East 48th St., 4 story, basement, sub-basement bank, 909 Madison Ave. $150,000. Noted Aug. 12.

BIDS ASKED

Conn., New Haven—Aug. 25, by Connecticut Savings Bank, B. Mansfield, pres., 47 Church St., brick, steel addition, Crown and Church Sts. $150,000 or more. Edgerton Swartwout, 10 East 40th St., New York, archt. Noted Mar. 19.

OFFICES

PROPOSED WORK

N. J., East Orange—Owner, c/o Warren & Warren, archts., 31 Clinton St., Newark, sketches 2 story, basement, brick, steel, office, store, Central Ave., $150,000.

Tex., Laredo—W. Epstein will not build office, store, $400,000. Project indefinitely postponed. Noted June 4.

BIDS ASKED

N. J., Paterson—J. Holt, archt., 134 Market St., taking bids general and separate contracts 2 story, basement, 75 x 100 ft., brick, steel office, store, 247 Market St., for T. S. Barker, 175 Market St. $150,000. Noted Aug. 6.

CONTRACTS AWARDED

Mass., Boston—Judge Baker Found., c/o Derby, Barnes & Champney, archts., 3 Joy St., brick, steel office, plain found., to Sawyer Constr. Co., Park Sq. Bldg. Est. $150,000. Noted Aug. 6.

N. J., Camden—Pub. Serv. Gas & Electric Co., Camden, general contract 2 story, basement, 70 x 120 ft., brick, steel office, to United Engineers & Constructors, Inc., 80 Park Pl., Newark. Est. $150,000.

Que., Quebec—Dpt. P. Wks., 8 story office, to Adelard Deslauriers Ltd., Quebec, $475,800.

STORES

PROPOSED WORK

Calif., Beverly Hills — Corporation forming, C. B. Hopper, interested, Tower Rd., sketches by Walker & Eisen, 1117 Western Pacific Bldg., Los Angeles, 6 story, 100 x 150 ft. department store, Rodeo Dr. and Brighton Way. $300,000.

Mass., Brockton — F. W. Woolworth Co., Park Sq., Boston, soon takes bids 3 story, basement, 156 x 180 ft., brick, steel, stone store and office, Main St. $150,000. Private plans. Noted May 28.

N. Y., New York—Westbuhre Constr. Co., B. Levenson, treas., 349 East 149th St., plans by W. Shary, 22 East 17th St., 2 story, 136 x 262 ft., store, office, theatre, Westchester Ave. and Pilgrim St. $150,000.

BIDS ASKED

Md., Baltimore—Aug. 21, by J. E. Sperry, archt., Calvert Bldg., 5 story, basement, mezzanine, 98 x 112 ft., brick, limestone, granite, steel store addition, North Howard St., for Hutzler Bros., Howard and Clay Sts. $250,000. H. F. Doeleman, Baltimore Trade Bldg., engr.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., Brooklyn—Kings-Utica Corp., A. Halpern, pres., 26 Court St., stores, apartments, Lennox Rd. and Utica Ave., separate contracts. $200,000. Cohn Bros., 215 Montague St., archt.

PUBLIC

PROPOSED WORK

Mass., Swampscott — ADMINISTRATION — Town, G. Glidden, in charge Planning Bd., Town Hall, sketches 2 units administration and memorial building, Burrill St. To exceed $150,000. Architect not appointed.

N. J., Jersey City—ARMORY—State Military Bd. Quartermaster's Office, Trenton, rejected bids July 20, 4 story, basement, 225 x 320 ft., brick, steel, rein.-con. armory. Will readvertise. Noted July 2.

N. Y., Jamaica—COURT HOUSE—G. U. Harvey, pres., Queens Boro, Queens Subway Bldg., Long Island City, court house. $1,500,000. **Maturity about January.**

N. Y., New York—JAIL—S. Levy, pres. Manhattan Boro, Municipal Bldg., bids late in fall, general contract 8 story, 43 x 248 ft. jail, River Ave. and 151st St. $700,000. M. Hausle, 3307 3rd Ave., and J. Freedlander, 681 5th Ave., archts. Noted July 30.

Tex., Port Arthur—COURT HOUSE, etc.—Jefferson Co., c/o Judge, Beaumont, voted $150,000 court house and jail. Architect not appointed.

BIDS ASKED

Ia., Eldora—JAIL—Aug. 28, at office J. G. Bridges, aud. Hardin Co., remodeling jail.

R. I., East Providence — MARKET — Providence Pub. Market Co., O. Swanson, 380 Westminster St., taking bids 2 story, basement, brick, steel, plain found., Taunton Ave. $150,000. V. Skoglund, 828 Eddy St., Providence, archt.

S. D., Pierre—CAPITOL—Sept. 10, by State, W. M. Dunn, state aud., and J. Berg, state engr., 4 story, basement, 68 x 138 ft., stone annex. $300,000. Perkins & McWayne, 322 Paulton Blk., Sioux Falls, archts. Noted May 28.

W. Va., Clarksburg—COURT HOUSE—Aug. 31, by Bd. Comrs. Harrison Co., M. L. Louchin, clk., 5 story, basement, 110 x 130 ft., concrete, steel, stone. $350,000. E. J. Wood & Son, Clarksburg, assoc. archt. Walker & Weeks, 2341 Carnegie Ave., Cleveland, O., archts. Noted May 7.

CONTRACTS AWARDED

Calif., Tehachapi — DETENTION HOME — State Dpt. P. Wks., Sacramento, general contract 2 story, rein.-con., to A. Johnson, South Pasadena, $72,490; electric wiring, to G. L. Patterson, 646 Maple St., Los Angeles, $2,355; heating, to J. B. Walsh, to Los Angeles, $10,694; plumbing, to Hichman Bros., 910 East Anaheim St., Long Beach, $11,990. Grand total $97,529. Noted July 23.

Mass., Worcester—AUDITORIUM—City, Worcester Memorial auditorium, 188 x 288 ft., brick, steel, stone, to Geo. A. Fuller Co., 11 Beacon St., Boston, $1,753,000. Noted July 16.

N. J., Hackensack—ADMINISTRATION—Bd. Freeholders Bergen Co., Court House, plumbing for 6 story, basement, 200x400 brick, steel administration building, to Jaehnig & Peoples, Inc., 221 13th Ave., Newark, $24,800; heating, to D. McGrath Co., 185 Moore St., $21,049. Noted May 28.

Wyo., Evanston — EMPLOYEES — State Bd. Charities & Reform, employees' building for State Mental Hospital, to G. Carruth & Sons, Evanston, $74,129. Noted Aug. 13.

UNCLASSIFIED

PROPOSED WORK

Calif., San Diego—MUSEUM—San Diego Society of Natural History, Balboa Park, plans by W. T. Johnson, Electric Bldg. (1st unit) 2 story, 60 x 220 ft., rein.-con. building, Balboa Park. $150,000. Total est. $1,000,000.

Calif., Westgate Heights—HOME for AGED—Eastern Star Home of California, 1507 North Fairoaks St., Pasadena, plans by Train & Cressey, 226 Western Mutual Life Bldg., Los Angeles (1st unit) group rein.-con. buildings, Beverly Blvd. and Chaparal St. $250,000.

Ill., East St. Louis — MAUSOLEUM — St. Clair Memorial Park, P. H. McAvoy, mgr., 219 Goldman Bldg., bids in September or October, 110 x 250 ft. mausoleum, 90 ft. high, monolithic concrete, probably faced with marble, 1,000 to 1,200 crypts, Lincoln Hy. near French Village. $200,000 Lovell & Lovell, 224 East Ontario St., Chicago, archts.

Ia., Spencer—EXCHANGE—Northwestern Bell Telephone Co., J. O. Levea, local mgr., rein.-con., brick, 5th and West Sts. $150,000, incl. equipment.

N. J., Trenton — PASSENGER STATION — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., 2 story, basement, brick, steel, Clinton St. $2,000,000. **Maturity about Dec. 1 or later.** Noted Feb. 5.

N. Y., Brooklyn—MAUSOLEUM—Cemetery of Holy Cross, 75 Green Ave., bids probably late in October, superstructure mausoleum, Holy Cross Cemetery, Snyder Ave. $190,000. G. B. Webb, 10 East 43rd St., New York, archt. Noted July 23.

N. Y., Brooklyn—ASYLUM—Brooklyn Hebrew Orphanage, plans by M. H. Freehoff, 415 Lexington Ave., 4 story, Pacific St. and Ralph Ave.

Pa., Pittsburgh—HOME for AGED—Little Sisters of the Poor, Mother Agatha, in charge, 1028 Benton Ave. N. S., plans by Kaiser, Neal & Reed, Keystone Bank Bldg., rebuilding brick home, Penn and Aiken Sts. $300,000-$600,000.

BIDS ASKED

Ind., Ft. Wayne—ORPHANS' HOME—Aug. 26, by St. Vincents Home, 2000 Wells St., brick, steel orphans home, incl. school, power plant, Wells St. and Archer Ave., $500,000. A. M. Strauss, 415 Cal-Wayne Bldg., archt., R. W. Noland, 408 Cal-Wayne Bldg., engr.

Mass., Boston—HOME — Home for Aged Women, South Huntington Ave., taking bids 3 story, basement, brick, steel annex, plain found. $150,000. Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., archts.

Mass., Greenfield—COURT HOUSE—Sept. 1, by Comrs. Franklin Co., H. E. Adams, secy. comn., 65 x 130 ft. and 65 x 95 ft., brick, stone, Main and Hope Sts. $400,000. E. C. and G. C. Gardner, and F. W. S. King, 33 Lyman St., Springfield, archts. Noted Aug. 13 Daily.

N. J., Newark—MERCANTILE—H. J. and J. V. King, archts., 222 Market St., taking bids 4 story, basement, brick, steel, 249 Mulberry St., for James F. Collins & Co., 140 Mulberry St. Est. $150,000.

CONTRACTS AWARDED

Calif., San Francisco—WAR MEMORIAL and OPERA HOUSE—San Francisco War Memorial Com., cast stone for opera house, to MacGruer

Unclassified (Continued)

& Co., 266 Tehama St., $47,773; cast stone for veterans' war memorial, to J. D. McGilvary, 147 28th Ave., $17,995; lathing and plastering, to P. Bradley, 639 Brannan St., opera house $71,000, veterans' memorial $98,750. Grand total $235,518. Noted Aug. 6.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., San Jose — PACKING PLANT — San Jose Meat Co. (Adrian Lassere), Berryessa Rd., rebuilding plant, recently destroyed by fire. $50,000 or more. Architect not appointed.

Conn., New Haven—FACTORY—Berger Bros., 35 Derby Ave., plans by D. Orr, 956 Chapel St., and soon takes bids 5 story, 40 x 120 ft., brick, Derby Ave. $75,000.

Mass., Salem—BAKERY—S. DeFrancisco, 11 Wisteria St., sketches bakery, Broad Street extension. $40,000. Private plans.

Minn., St. Paul—PLAYING CARD FACTORY—Brown & Bigelow, C. A. Ward, genl. mgr., Quality Park, 3 story, basement, rein.-con., brick, factory. $250,000. Toltz, King & Day, 1212 Builders Exch., archt.

N. J., Bayonne—OIL REFINING PLANT—Tidewater Oil Co., Constable Hook, oil refining plant, incl. cracking coil equipment. $200,000. Private plans.

N. J., Carteret—CHEMICAL PLANT—Warner Chemical Co., will not build steel, Roosevelt Ave. $40,000. Project abandoned. Architect not appointed. Noted July 30.

N. J., Linden—FACTORY—Atlantic Romper Co., Inc., 50 Atlantic Ave., 2 story, basement, 60 x 200 ft., brick, steel, Atlantic St. $40,000. Bids in Project in abeyance. J. Anderson, 251 North Broad St., Elizabeth, archt. Noted July 23.

N. J., Rutherford—FACTORY—Owner, c/o F. Perrone, archt., 104 Midland Ave., Garfield, 2 story, basement, brick, steel, addition, $50,000. **Maturity in May 1932.** Noted Aug. 13.

N. Y., Brooklyn — LAUNDRY — Brighton Laundry Co., West 6th St. and Sheepshead Bay, general contract laundry. $40,000. J. M. Fenichel, 468 4th Ave., New York, archt. Project in abeyance. Noted July 30.

N. Y., Brooklyn—LAUNDRY—State Laundry, Inc., A. Abrahams, pres., plans by T. Goldstone, 191 Joralemon St., altering 3 story laundry, Myrtle and Nostrand Aves. To exceed $40,000.

N. Y., Long Island City—FACTORY—Paragon Paint Co., 47 10th St., will not build 100 x 100 ft. factory, 10th St. and Vernon Ave., $150,000. Project abandoned. Noted Oct. 23.

N. Y., New York—LAUNDRIES—Sweet Laundry Shops, Inc, 405 Lexington Ave., chain of laundries. To exceed $40,000.

N. Y., Port Richmond—LAUNDRY—Pal-Birn Steam Laundry Co., J. Palladino, pres., 89 Jewett Ave., plans by M. G. Uslan, 57 Bay St., St. George, altering and constructing 1 story, 25x75 ft., and 1 story, 50x65 ft., brick, steel additions. $40,000.

O., Galion—FACTORY—W. H. Hatch, archt., Hippodrome Annex Bldg., Cleveland, soon lets contract 1 story, 90 x 200 ft., brick, steel, for Gledhill Road Mchy. Co., E. C. Gledhill, pres. $50,000. Noted Jan. 1.

O., Painesville—ASSEMBLY PLANT—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., has option on 365 acre site on Grand River for construction of assembly plant. Est. $7,000,000.

Pa., Freedom—MILL—J. E. Martsolf, archt., 3rd Ave., New Brighton, son lets contract 2 story, basement, 69x241 ft., brick, concrete, steel, 3rd Ave., for Freedom Oil Co., E. J. Bischoffberger, gen. mgr.

Tex., San Benito—CITRUS BY-PRODUCTS PLANT—F. G. Paige, Lincoln, Neb., sketches 2 story, rein.-con., brick, plain found. $70,000. Private plans.

R. I., East Providence (br. Providence)—FACTORY—Eveready Cleaners & Dyers, 205 Cranston St., Providence, abandoned until spring construction factory. $40,000. A. O. Kurze, c/o owners, archt. Noted May 7.

BIDS ASKED

Pa., Ambridge—PIPE MILL—Spang Chalfant & Co., G. Fisher, pres., Clark Bldg., Pittsburgh, taking bids and open same about Aug. 18, general contract 1 story, 125 x 500 ft., steel experimental electric weld pipe mill, adjacent to present plant. Private plans. Noted July 24, 1930.

CONTRACTS AWARDED

Ill., Chicago—FACTORY—Pressed Steel Car Co., Farmers Bank Bldg., Pittsburgh, Pa., 1 story, brick, steel, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $60,000.

Ill., Clearing (sta., Chicago)—FACTORY—Clearing Industrial Dist., 38 South Dearborn St., Chicago, contract for design and construction 2 story, 135,000 sq.ft. floor space, steel truss, cast stone factory, incl. heating plant, offices, laboratories, cafeteria, hospital, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. $500,000. Pepsodent Co., 919 North Michigan Ave., Chicago, lessee. Noted Aug. 6.

Ind., Evansville—PRINTING PLANT—Keller-Crescent Paper Co., 216 Locust St., general contract 50 x 100 ft., rein.-con., brick, steel, to M. J. Hoffman Constr. Co., 20 Northwest 4th St. Est. $40,000.

Ind., Ft. Wayne—FACTORY—Zollner Machine Co., Bueter Rd., general contract 1 story, 50 x 150 ft., rein.-con., brick, steel, to Buesching & Hagerman Co., 402 East Superior St. Est. $45,000.

Ind., Indianapolis—RUG CLEANING PLANT—P. J. Shampag, 4801 Washington Blvd., general contract 2 story, basement, 50 x 104 ft., brick, steel, rear 1910 North Meridian St., to A. V. Stackhouse, 2611 Cornell Ave. Est. $40,000.

Mass., Boston—PLANT—City Ice & Fuel Co., 68 Lowell St., 1 story, 100x250 ft., brick, plain found., to Pitman & Brown Co., 11 Washington St., Salem. Est. $40,000.

Mich., Detroit—AUTO FACTORY—Chrysler Motor Car Corp., Massachusetts Ave., Highland Park, 1 story, 192 x 240 ft., concrete, brick, steel, plain found., to H. G. Christman-Burke Co., 1010 Fisher Bldg. Noted Aug. 6.

Mich., Detroit—STORAGE and DISTRIBUTION—Standard Sanitary Mfg. Co., Bessemer Bldg., Pittsburgh, Pa., and 18 East 45th St., New York, 2 story storage and distribution plant, to P. H. Piper Co., 612 Michigan Theatre Bldg. Est. $65,000.

N. J., Newark—BEEF COOLER—L. Schloss, Inc., foot Astor Pl., general contract 1 story, basement, brick, steel, Astor St. to Lustbader Constr. Corp., 145 East 45th St., New York. Est. $40,000. Noted Aug. 6.

Tex., Corpus Christi—COMPRESS PLANT—Aransas Compress Co., 6 rein.-con., brick, tile units to present plant, totaling 350 x 400 dimensions, to Chas. F. Runck, Corpus Christi. $100,000. Noted Apr. 23.

Tex., Edinburg—PACKING PLANT — Texas Citrus Fruit Growers Assn., c/o J. Shary, pres., Mission, 2 story, basement, 125x160 ft., citrus fruit and vegetable packing plant, to W. A. Velton, Brownsville. $43,000.

R. I., Providence — MAINTENANCE — State Bd. P. Rds., 2 story, 100 x 120 ft., rein.-con., brick maintenance headquarters building, Okie and Arline Sts., to Merritt, Chapman & Scott, Industrial Trust Bldg., $58,826.

GARAGES

PROPOSED WORK

Mass., Boston—Boston Terminal Co., A. V. Russell, in charge, South Station, reconstructing terminal basement in South Station into 1 story garage, Atlantic Ave. and Summer St. To exceed $40,000. Private plans.

N. Y., Mamaroneck—Chatsworth Furniture & Decorating Co., Larchmont, service building, workroom, store, Boston Rd. To exceed $40,000. **Maturity late in September.**

N. Y., New York—S. Cincelli, 2992 Arthur Ave., bids after Aug. 20, general and separate contracts 1 story, 90 x 119 ft., service garage, Hoffman and 184th Sts. $40,000. M. W. Del Gaudio, 545 5th Ave., archt. Noted May 21.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., general contract garage, Welfare Island, opposite 61st St. $150,000. **Maturity in December or later.** B. R. Swartburg, 2 West 46th St., archt. Noted Mar. 12.

N. Y., New York—Five Hundred Forty-One West 20th Street Constr. Corp., J. S. Kahn, pres., 285 Madison Ave., plans by W. Shary, 22 East 17th St., 3 story, basement, brick, service garage, 537 West 20th St. $120,000.

BIDS ASKED

Mass., Boston—See "Contracts Awarded."

Mass., Franklin—R. Vozella, City Mills, taking bids 1 story, 90 x 100 ft., brick, steel auto service and showroom, concrete found., East Central St. $40,000. Private plans.

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Boston—Charlestown Five Cent Bank, 1 Thompson Sq., Charlestown, reconstructing 5 story, 80 x 175 ft., concrete, brick, steel garage, 81 Wareham St., South End Sect., separate contracts. Est. $40,000 or more.

Mass., Boston—Shell Eastern Pet. Products Co., 141 Milk St., 1 and 2 story, 85 x 140 ft., rein.-con. garage and service stations, Commonwealth Ave. at Cottage Farm Bridge, to Chase & Gilbert, Park Sq. Bldg. Est. $50,000.

N. Y., New York—Five Hundred Forty-One West 20th Street Constr. Co., J. S. Kahn, 285 Madison Ave., 3 story, basement, service garage, 531 West 20th St., separate contracts. $115,000. **Maturity soon.** W. Shary, 22 East 17th St., archt. Noted Aug. 20.

N. Y., New York—A. Monteleone, 2952 Park Ave., 1 story service garage, 152nd St. and Park Ave., day labor and separate contracts. $40,000. M. W. Del Gaudio, 545 5th Ave., archt. Noted July 30.

N. Y., New York—J. F. McGowan Marble Co., 1180 Randall Ave., 150 x 200 ft. service garage, Legett Ave. and Barry St., separate contracts. $40,000. Private plans. Noted July 30.

SHOPS AND FOUNDRIES

PROPOSED WORK

Ont., Hamilton — SHOPS — Canadian Natl. R.R., Montreal, Que., C. S. Gzowski, ch. engr. (constr.), reconstructing machine shops, recently destroyed by fire. $100,000.

CONTRACTS AWARDED

Mass., Boston—MACHINE and BLACKSMITH SHOPS — D. Macaulay, 436 Atlantic Ave., 1 story, brick, plain founds., to F. Leroy Fox, 15 Exchange St. Est. $40,000.

POWER PLANTS

PROPOSED WORK

Mich., Wyandotte—City Council, 1 and 2 story, brick, steel, rein.-con. power house, incl. steam operated electric power generating equipment, Van Alstyne Blvd. and Vinewood Ave. $300,000. Froelich & Emery, 2nd Natl. Bank Bldg., Toledo, O., engrs.

O., Cleveland—Hughes Provision Co., W. Hughes, pres., 3199 West 65th St., plans by H. M. Morse & Co., archts and engrs., Finance Bldg., 1 and 2 story, 47x63 ft., brick, steel, concrete boiler house, 3199 West 65th St. $40,000.

Okla., Pryor—See "Waterworks."

BIDS ASKED

Ind., Ft. Wayne—Sept. 3, by Bd. P. Wks., City Hall, boiler house, incl. boilers, superheaters, mechanical stokers, 2 ashhoppers, 2 forced draft fans, 2 induced draft fans, 3 boiler feed pumps with drives and motors, 6 centrifugal pumps, boilers and motors, 1 deaerating heater, dual driven exciter. North Clinton St. $252,000. Froelich & Emery Eng. Co., 410 2nd Natl. Bank Bldg., Toledo, O., consult. engr.

Ind., Ft. Wayne—See "Buildings Unclassified."

Mass., Westboro—Aug. 25, by Trustees of Mass. Training Schools, Dpt. P. Welfare, Boston, altering and reconstructing 1 story, brick boiler house at Lyman School for Boys. $50,000. Densmroe, LeClear & Robbins, Park Sq. Bldg., Boston, archts.

N. H., Concord—Aug. 25, by New Hampshire State Hospital, W. A. Stone, purch. agt., State House, brick, concrete power plant, $40,000. R. D. Kimball Co., 6 Beacon St., Boston, archts., Noted Aug. 12.

CONTRACTS AWARDED

Ill., Chicago—Commonwealth Edison Co., 72 West Adams St., power plant, to George A. Fuller Co., 32 West Randolph St. Est. exceeds $150,000.

Mass., Boston—House of Liederman, Inc., 169 Norfolk Ave., Roxbury, 1 story, rein-con. boiler plant, Norfolk Ave., to H. E. Cline, 43 Tremont St. Est. $40,000.

Vt., Bennington—State, c/o G. H. T. Johnson, Montpelier, general contract, 1 story, brick, steel, concrete central heating plant, to M. J. Burrington, Jr., 495 Main St., $13,722; heating and plumbing to M. H. McLaughlin, Rutland, $10,620.

Ontario—Abitibi Power & Paper Co., 88 University Ave., Toronto, sluice gates, to Dominion Bridge Co. Ltd., 1139 Shaw St., Toronto; five 65,000 hp. turbines, to Canadian Allis-Chalmers, 212 King St. W., Toronto, transformers, to Canadian General Electric Co., 212 King St. W, Toronto; cable for 114 mi. 132,000 v. double circuit tranmission lines, to Aluminum Co., of Canada, 158 Sterling Rd., Toronto; insulators, to Canadian Porcelain Co., Aberdeen Ave., Hamilton, and Canadian Ohio Brass Co., Niagara Falls; ground wire, to Canada Wire & Cable Co., Leaside, all above in connection with hydro-electric development at Abitibi Canyon. Total est. $20,000,000. Noted Aug. 28, 1930, under "Contracts Awarded."

WAREHOUSES

PROPOSED WORK

Mass., Tewksbury—Commonwealth of Massachusetts, Dpt. P. Welfare, Boston, 2 story, brick, stone, steel storage building at State Infirmary. $40,000. Private plans.

N. J., East Burlington—Standard Oil Co. of New Jersey, 26 Bway., New York, large storage and distribution plant, along Delaware River, incl. dock, tanks, offices. $100,000.

Man., Winnipeg — MacDonald Consolidated Grocers, Ltd., 116 Market St. E., reconstructing concrete, brick, steel warehouse. $200,000.

BIDS ASKED

N. J., Jersey City — Mahnken & Schultz, archts., 26 Journal Sq., taking bids (from selected list of contractors), 1 story, basement, 150 x 200 ft., brick, steel, rein.-con. warehouse, Tonnele Ave., for Culbert Pipe & Fittings Co., 170 8th St. $150,000.

CONTRACTS AWARDED

Ill., Carbondale—Kroger Grocery & Baking Co., 35 East 7th St., Cincinnati, warehouse, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. $85,000.

N. Y., New York — Grand Allen Holding Corp., 16 Court St., Brooklyn, storage-furniture showrooms and shop, 314 Grand St., to Star Constr. Co., c/o A. Farber, archt., 16 Court St., Brooklyn. Est. $50,000.

N. Y., New York—New York, New Haven & Hartford R.R. Co., E. E. Oviatt, ch. engr., New Haven, Conn., warehouse addition, 132nd St., to Austin Co., 120 Bway., New York, and 326 Frelinghuysen Ave., Newark, N. J. Est. exceeds $100,000.

See proposal advertising on page 75

Constr. News page 79

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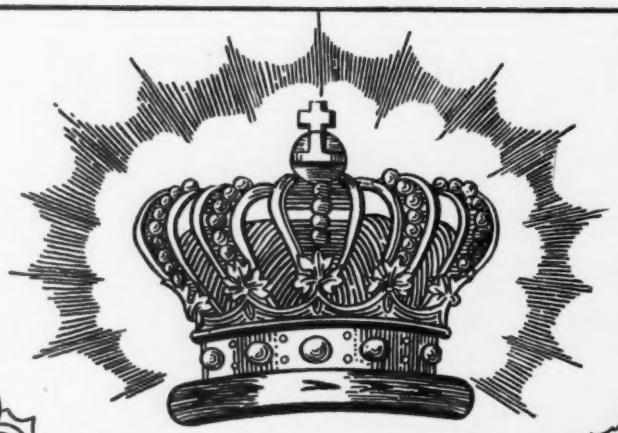

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